

ภาคผนวก ง

ใบรับรองผลการตรวจวัดคุณภาพสิ่งแวดล้อม

ใบรับรองผลการตรวจวัดคุณภาพอากาศในบรรยากาศ



Ambient Air Monitoring Results : Sulfur dioxide

MTR-SPRC PLC-Refinery

Location : With in Refinery Plant, North

Monitor Period : 01-08 Nov 2024

Analyzer Model : API 100A

Station No : SS2-09

Serial No : 906

Site Operator : Mr. Siwanon Kulawong

Calibrator Model : Teledyne 700E

Serial No : 587

Calibration Gas Cylinder I.D.: EB0102326

Certified Date : 08 Jan 2024


Cal Concentration (ppb) : 0,100,200,400

Expire Date : 07 Jan 2025

Time	SO2 Concentration (ppb)						
	01-02 Nov 2024	02-03 Nov 2024	03-04 Nov 2024	04-05 Nov 2024	05-06 Nov 2024	06-07 Nov 2024	07-08 Nov 2024
08:00 - 09:00	7.9	8.7	9.8	9.4	9.2	7.9	9.4
09:00 - 10:00	9.1	9.2	9.5	8.3	7.7	9.8	9.6
10:00 - 11:00	8.7	8.0	9.1	7.5	7.6	9.8	9.3
11:00 - 12:00	9.3	8.7	9.4	10.1	7.6	12.1	7.3
12:00 - 13:00	10.4	6.8	6.7	7.8	7.7	8.9	10.9
13:00 - 14:00	8.0	7.0	6.8	6.7	8.9	6.8	14.7
14:00 - 15:00	7.9	9.5	6.9	10.3	10.4	10.3	9.3
15:00 - 16:00	7.2	8.1	8.2	10.4	7.5	8.2	6.4
16:00 - 17:00	7.6	10.5	7.1	7.5	8.5	11.1	8.5
17:00 - 18:00	7.7	10.8	6.8	7.0	7.5	8.0	7.3
18:00 - 19:00	9.5	8.9	9.6	9.5	8.9	8.9	8.9
19:00 - 20:00	8.4	8.7	10.4	9.5	6.9	7.2	8.9
20:00 - 21:00	9.2	24.1	7.7	7.0	9.3	9.0	6.2
21:00 - 22:00	7.6	8.3	8.0	7.8	7.9	6.5	10.0
22:00 - 23:00	7.6	7.5	9.8	7.1	9.4	10.1	9.8
23:00 - 00:00	8.3	7.5	7.9	9.6	7.5	8.4	6.8
00:00 - 01:00	9.4	6.9	9.9	9.6	8.7	10.0	10.1
01:00 - 02:00	8.6	10.1	10.5	7.4	9.0	8.7	7.5
02:00 - 03:00	8.0	10.2	10.0	8.9	8.4	7.5	9.3
03:00 - 04:00	7.7	7.2	7.6	6.7	9.6	9.8	9.8
04:00 - 05:00	8.9	10.3	10.3	9.6	8.6	9.1	9.0
05:00 - 06:00	7.2	7.8	8.7	6.7	8.4	8.6	7.2
06:00 - 07:00	8.0	8.8	7.5	9.7	7.0	7.7	6.0
07:00 - 08:00	7.8	9.8	10.5	7.6	7.6	9.6	10.0
Average-24Hr*	8.3	9.3	8.7	8.4	8.3	8.9	8.8
Max-1Hr	10.4	24.1	10.5	10.4	10.4	12.1	14.7
Min-1Hr	7.2	6.8	6.7	6.7	6.9	6.5	6.0
Standard-1Hr	300 ppb(780 ug/cu.m)						
Standard-24Hr	120 ppb(300 ug/cu.m)						

Remark : * Average time between 08:00-08:00


 (Miss Katesarin Vorradetwittaya)
 Environmental Scientist


 (Miss Preeda Somjai)
 Technical Management Team



Ambient Air Monitoring Results : Sulfur dioxide

MTR-SPRC PLC-Refinery

Location : Map Ta Phut New Town

Analyzer Model : API 100A

Serial No : 347

Monitor Period : 01-08 Nov 2024

Station No : SS2-05

Site Operator : Mr. Siwanon Kulawong

Calibrator Model : Teledyne 700E

Serial No : 587

Calibration Gas Cylinder I.D.: EB0102326

Certified Date : 08 Jan 2024

Cal Concentration (ppb) : 0,100,200,400

Expire Date : 07 Jan 2025

Time	SO2 Concentration (ppb)						
	01-02 Nov 2024	02-03 Nov 2024	03-04 Nov 2024	04-05 Nov 2024	05-06 Nov 2024	06-07 Nov 2024	07-08 Nov 2024
10:00 - 11:00	4.6	7.7	7.0	6.9	7.8	7.6	5.0
11:00 - 12:00	5.6	4.9	6.3	4.9	6.1	8.4	5.8
12:00 - 13:00	7.8	5.7	7.2	4.5	4.6	8.2	12.5
13:00 - 14:00	4.9	4.9	4.2	6.4	4.7	7.3	5.8
14:00 - 15:00	6.3	7.6	7.2	4.5	6.1	17.6	6.4
15:00 - 16:00	7.8	7.5	7.1	6.9	6.4	5.5	6.9
16:00 - 17:00	7.2	7.5	4.5	7.9	5.4	6.6	3.8
17:00 - 18:00	7.8	4.4	7.8	4.3	7.7	6.5	6.2
18:00 - 19:00	5.3	6.9	4.9	5.3	3.9	6.1	5.9
19:00 - 20:00	5.4	5.7	7.4	5.0	4.2	4.6	6.2
20:00 - 21:00	4.4	9.2	6.6	4.6	6.9	6.2	6.4
21:00 - 22:00	6.8	6.0	5.4	5.8	6.9	5.3	5.2
22:00 - 23:00	7.8	5.9	6.3	7.1	7.1	4.6	7.3
23:00 - 00:00	4.1	4.4	7.3	7.6	5.1	4.9	6.1
00:00 - 01:00	7.1	6.5	6.8	5.5	5.3	5.2	5.1
01:00 - 02:00	7.5	4.9	4.4	4.9	5.3	6.3	7.6
02:00 - 03:00	7.7	4.4	7.1	5.1	6.6	5.5	5.4
03:00 - 04:00	7.9	4.7	5.1	4.3	5.6	4.6	4.7
04:00 - 05:00	7.1	4.0	7.3	7.8	5.1	7.0	6.9
05:00 - 06:00	7.3	5.2	4.0	7.2	4.4	6.3	4.7
06:00 - 07:00	4.4	5.5	7.8	3.9	6.0	6.0	7.1
07:00 - 08:00	5.1	4.2	7.2	4.3	3.8	5.1	6.7
08:00 - 09:00	6.5	5.1	6.5	5.0	5.0	7.0	6.7
09:00 - 10:00	7.4	3.9	5.6	6.5	5.6	6.5	4.5
Average-24Hr*	6.4	5.7	6.3	5.7	5.7	6.6	6.2
Max-1Hr	7.9	9.2	7.8	7.9	7.8	17.6	12.5
Min-1Hr	4.1	3.9	4.0	3.9	3.8	4.6	3.8
Standard-1Hr	300 ppb(780 ug/cu.m)						
Standard-24Hr	120 ppb(300 ug/cu.m)						

Remark : * Average time between 10:00-10:00

(Miss Katesarin Vorradetwittaya)
 Environmental Scientist

(Miss Preeda Somjai)
 Technical Management Team



Ambient Air Monitoring Results : Sulfur dioxide

MTR-SPRC PLC-Refinery

Location : Ban Plong Community

Monitor Period : 01-08 Nov 2024

Analyzer Model : Thermo 43C

Station No : SS2-01

Serial No : 0607415773

Site Operator : Mr. Siwanon Kulawong

Calibrator Model : Teledyne 700E

Serial No : 587

Calibration Gas Cylinder I.D.: EB0102326

Certified Date : 04 Jan 2024

Cal Concentration (ppb) : 0,100,200,400

Expire Date : 03 Jan 2025

Time	SO2 Concentration (ppb)						
	01-02 Nov 2024	02-03 Nov 2024	03-04 Nov 2024	04-05 Nov 2024	05-06 Nov 2024	06-07 Nov 2024	07-08 Nov 2024
09:00 - 10:00	7.7	6.0	6.5	5.3	8.8	8.8	6.5
10:00 - 11:00	7.8	7.5	7.3	8.7	5.7	6.7	5.8
11:00 - 12:00	8.2	6.6	6.8	8.5	5.2	8.3	8.5
12:00 - 13:00	8.8	7.8	5.0	8.2	5.2	18.4	7.3
13:00 - 14:00	8.2	8.4	8.7	8.9	6.7	5.2	7.7
14:00 - 15:00	7.3	5.5	5.5	7.7	5.5	7.2	6.7
15:00 - 16:00	5.5	5.5	6.8	6.6	6.3	19.0	6.2
16:00 - 17:00	7.5	8.2	8.8	5.2	8.3	8.7	6.6
17:00 - 18:00	6.6	5.2	5.1	5.5	8.5	10.0	7.3
18:00 - 19:00	7.6	8.7	7.9	6.2	6.6	8.2	5.8
19:00 - 20:00	6.1	7.3	6.9	8.5	6.5	4.8	5.4
20:00 - 21:00	5.0	5.0	4.9	4.9	4.9	7.8	5.0
21:00 - 22:00	8.7	10.2	7.2	7.8	8.3	7.2	7.2
22:00 - 23:00	6.6	7.0	6.3	7.9	6.5	5.1	5.6
23:00 - 00:00	5.0	8.7	6.2	5.7	4.9	5.0	6.3
00:00 - 01:00	5.1	8.6	8.7	8.2	7.4	6.8	4.8
01:00 - 02:00	6.7	6.2	7.3	8.8	8.1	6.6	6.1
02:00 - 03:00	8.9	4.9	5.6	5.7	8.0	5.6	7.7
03:00 - 04:00	7.9	5.6	6.7	6.0	6.6	6.0	8.8
04:00 - 05:00	5.3	6.0	6.5	8.4	7.4	6.7	7.2
05:00 - 06:00	8.5	8.9	7.3	5.3	6.4	5.6	5.0
06:00 - 07:00	8.9	8.4	7.2	7.3	5.7	7.5	8.7
07:00 - 08:00	7.0	7.5	6.2	8.7	7.2	5.2	6.9
08:00 - 09:00	5.3	6.3	7.9	6.4	8.3	7.9	6.7
Average-24Hr*	7.1	7.1	6.8	7.1	6.8	7.8	6.7
Max-1Hr	8.9	10.2	8.8	8.9	8.8	19.0	8.8
Min-1Hr	5.0	4.9	4.9	4.9	4.9	4.8	4.8
Standard-1Hr	300 ppb(780 ug/cu.m)						
Standard-24Hr	120 ppb(300 ug/cu.m)						

Remark : * Average time between 09:00-09:00

(Miss Katesarin Vorradetwittaya)
Environmental Scientist

Preeda S.
(Miss Preeda Somjai)
Technical Management Team



Ambient Air Monitoring Results : Nitrogen dioxide MTR-SPRC PLC-Refinery

Location : With in Refinery Plant, North

Monitor Period : 01-08 Nov 2024

Analyzer Model : Thermo 42C

Station No : SS2-09

Serial No : 0426708263

Site Operator : Mr. Siwanon Kulawong

Calibrator Model : Teledyne 700E

Serial No : 587

Calibration Gas Cylinder I.D.: EB0102326

Certified Date : 05 Jan 2024

Cal Concentration (ppb) : 0,100,200,400

Expire Date : 04 Jan 2025

Time	NO2 Concentration (ppb)						
	01-02 Nov 2024	02-03 Nov 2024	03-04 Nov 2024	04-05 Nov 2024	05-06 Nov 2024	06-07 Nov 2024	07-08 Nov 2024
08:00 - 09:00	15.5	2.3	3.3	3.5	7.2	9.9	8.0
09:00 - 10:00	14.4	4.7	3.4	9.2	7.1	8.2	6.9
10:00 - 11:00	15.1	5.1	2.8	4.9	9.8	7.0	4.7
11:00 - 12:00	4.0	5.2	5.3	8.3	7.2	6.2	6.2
12:00 - 13:00	9.4	8.5	3.6	7.3	4.3	9.8	5.0
13:00 - 14:00	16.1	3.8	4.5	7.8	9.3	10.8	7.1
14:00 - 15:00	19.9	5.7	3.0	7.7	5.6	8.1	6.4
15:00 - 16:00	14.1	8.2	2.2	18.8	12.3	10.1	7.4
16:00 - 17:00	11.4	10.3	8.7	10.4	8.2	9.3	10.6
17:00 - 18:00	11.9	8.0	9.3	19.3	15.2	8.3	13.9
18:00 - 19:00	20.5	8.3	11.0	18.0	19.7	15.1	23.4
19:00 - 20:00	13.1	5.8	13.2	8.1	8.5	20.0	11.9
20:00 - 21:00	14.8	8.4	8.2	19.7	6.3	20.2	8.9
21:00 - 22:00	19.1	5.7	10.1	7.7	3.9	10.0	10.3
22:00 - 23:00	7.2	3.4	6.1	6.3	3.9	8.0	9.8
23:00 - 00:00	9.3	3.2	3.9	4.3	7.0	5.0	19.4
00:00 - 01:00	7.6	2.1	4.3	5.8	5.2	5.5	6.6
01:00 - 02:00	2.7	2.1	3.7	4.3	7.4	5.3	5.0
02:00 - 03:00	9.2	2.1	2.9	3.5	3.6	5.1	6.3
03:00 - 04:00	5.7	3.9	2.6	6.2	5.3	5.5	6.9
04:00 - 05:00	8.0	6.0	6.2	3.2	3.8	6.2	4.8
05:00 - 06:00	9.1	2.0	4.8	4.3	6.4	6.5	6.8
06:00 - 07:00	9.3	2.3	5.3	6.5	4.5	8.2	7.6
07:00 - 08:00	10.1	2.3	10.5	5.0	9.3	9.0	8.7
Average-24Hr*	11.6	5.0	5.8	8.3	7.5	9.1	8.9
Max-1Hr	20.5	10.3	13.2	19.7	19.7	20.2	23.4
Min-1Hr	2.7	2.0	2.2	3.2	3.6	5.0	4.7
Standard-1Hr	170 ppb(320 ug/cu.m)						
Standard-24Hr	-						

Remark : * Average time between 08:00-08:00

(Miss Katesarin Vorradetwittaya)
Environmental Scientist

Preeda S.
(Miss Preeda Somjai)
Technical Management Team



Ambient Air Monitoring Results : Nitrogen dioxide

MTR-SPRC PLC-Refinery

Location : Map Ta Phut New Town

Monitor Period : 01-08 Nov 2024

Analyzer Model : API 200A

Station No : SS2-05

Serial No : 1528

Site Operator : Mr. Siwanon Kulawong

Calibrator Model : Teledyne 700E

Serial No : 587

Calibration Gas Cylinder I.D.: EB0102326

Certified Date : 05 Jan 2024

Cal Concentration (ppb) : 0,100,200,400

Expire Date : 04 Jan 2025

Time	NO2 Concentration (ppb)						
	01-02 Nov 2024	02-03 Nov 2024	03-04 Nov 2024	04-05 Nov 2024	05-06 Nov 2024	06-07 Nov 2024	07-08 Nov 2024
10:00 - 11:00	18.1	1.9	4.2	4.6	11.1	5.4	7.6
11:00 - 12:00	4.4	4.4	4.6	7.8	4.6	4.7	4.0
12:00 - 13:00	8.6	9.9	5.7	10.7	6.6	9.9	5.5
13:00 - 14:00	14.6	3.3	3.9	9.7	7.1	9.9	3.7
14:00 - 15:00	16.9	5.9	5.1	8.4	5.8	8.6	5.8
15:00 - 16:00	17.1	6.7	5.9	16.7	8.5	9.2	4.6
16:00 - 17:00	14.7	9.1	7.5	11.2	8.6	11.5	8.7
17:00 - 18:00	13.6	6.2	10.1	18.2	12.8	8.9	21.1
18:00 - 19:00	20.2	8.5	6.9	14.0	15.7	16.3	19.9
19:00 - 20:00	10.2	5.7	19.1	11.3	7.6	13.9	11.6
20:00 - 21:00	12.6	10.3	8.9	16.4	3.0	13.9	12.5
21:00 - 22:00	16.9	2.6	9.0	9.2	6.8	10.4	7.8
22:00 - 23:00	6.6	4.3	3.3	4.7	4.0	5.9	12.8
23:00 - 00:00	7.2	2.1	5.8	5.8	3.8	4.0	18.3
00:00 - 01:00	6.3	2.8	5.2	4.1	5.7	4.9	4.8
01:00 - 02:00	2.3	4.3	2.3	3.7	5.9	4.1	3.9
02:00 - 03:00	7.3	3.0	4.3	3.3	6.1	5.1	5.3
03:00 - 04:00	10.0	5.4	3.9	5.4	4.5	3.8	7.1
04:00 - 05:00	5.5	4.8	5.9	6.4	3.3	5.2	4.5
05:00 - 06:00	7.8	3.4	4.8	3.2	6.6	5.6	6.3
06:00 - 07:00	9.1	2.7	2.7	4.0	3.6	7.5	4.3
07:00 - 08:00	8.9	3.6	10.2	5.6	7.6	11.4	10.7
08:00 - 09:00	1.5	2.0	5.2	3.4	11.4	4.3	7.3
09:00 - 10:00	1.7	5.9	10.1	5.9	10.2	6.8	9.5
Average-24Hr*	10.1	5.0	6.4	8.1	7.1	8.0	8.7
Max-1Hr	20.2	10.3	19.1	18.2	15.7	16.3	21.1
Min-1Hr	1.5	1.9	2.3	3.2	3.0	3.8	3.7
Standard-1Hr	170 ppb(320 ug/cu.m)						
Standard-24Hr							

Remark : * Average time between 10:00-10:00

(Miss Katesarin Vorradetwittaya)
Environmental Scientist

Preeda S.
(Miss Preeda Somjai)
Technical Management Team



Ambient Air Monitoring Results : Nitrogen dioxide

MTR-SPRC PLC-Refinery

Location : Ban Plong Community

Monitor Period : 01-08 Nov 2024

Analyzer Model : API 200A

Station No : SS2-01

Serial No : 2365

Site Operator : Mr. Siwanon Kulawong

Calibrator Model : Teledyne 700E

Serial No : 587

Calibration Gas Cylinder I.D.: EB0102326

Certified Date : 05 Jan 2024

Cal Concentration (ppb) : 0,100,200,400

Expire Date : 04 Jan 2025

Time	NO2 Concentration (ppb)						
	01-02 Nov 2024	02-03 Nov 2024	03-04 Nov 2024	04-05 Nov 2024	05-06 Nov 2024	06-07 Nov 2024	07-08 Nov 2024
09:00 - 10:00	18.3	3.4	3.0	7.1	6.3	10.9	4.6
10:00 - 11:00	16.3	4.1	2.2	6.0	10.2	4.0	4.7
11:00 - 12:00	2.0	2.6	5.1	6.8	5.8	5.8	6.5
12:00 - 13:00	4.8	9.2	5.0	9.4	5.1	8.1	5.0
13:00 - 14:00	16.7	1.7	2.9	6.1	11.2	10.7	6.8
14:00 - 15:00	13.9	10.0	1.7	9.2	5.9	11.7	7.0
15:00 - 16:00	18.6	7.8	4.0	17.4	10.8	8.9	6.8
16:00 - 17:00	13.4	6.8	5.7	8.8	10.8	9.2	9.9
17:00 - 18:00	10.0	8.5	7.9	16.3	14.2	7.8	17.1
18:00 - 19:00	22.9	9.1	10.6	19.6	12.5	16.0	16.1
19:00 - 20:00	19.2	9.4	13.9	6.4	8.7	14.2	10.9
20:00 - 21:00	17.3	10.1	6.0	17.9	2.7	17.8	10.3
21:00 - 22:00	13.1	2.1	8.0	8.4	4.2	9.4	11.1
22:00 - 23:00	8.2	3.2	5.6	5.6	4.5	3.9	12.8
23:00 - 00:00	6.6	5.2	3.3	2.3	3.5	5.3	22.1
00:00 - 01:00	6.1	2.5	5.4	3.7	5.3	3.6	5.9
01:00 - 02:00	2.1	2.4	4.0	2.7	5.7	6.8	4.4
02:00 - 03:00	7.2	2.3	3.1	3.6	5.6	3.9	4.4
03:00 - 04:00	7.4	2.6	2.1	2.4	3.3	5.9	4.0
04:00 - 05:00	8.9	1.4	4.2	3.0	5.5	5.2	5.3
05:00 - 06:00	7.1	3.4	3.0	2.9	5.7	3.6	7.2
06:00 - 07:00	7.5	3.3	5.2	5.2	6.9	11.7	4.3
07:00 - 08:00	7.4	4.0	10.3	4.7	11.5	8.7	11.7
08:00 - 09:00	1.7	4.7	3.0	6.1	7.5	5.8	5.6
Average-24Hr*	10.7	5.0	5.2	7.6	7.2	8.3	8.5
Max-1Hr	22.9	10.1	13.9	19.6	14.2	17.8	22.1
Min-1Hr	1.7	1.4	1.7	2.3	2.7	3.6	4.0
Standard-1Hr	170 ppb(320 ug/cu.m)						
Standard-24Hr	-						

Remark : * Average time between 09:00-09:00

(Miss Katesarin Vorradetwittaya)
Environmental Scientist

Preeda S.
(Miss Preeda Somjai)
Technical Management Team



Ambient Air Monitoring Results : Carbon monoxide

MTR-SPRC PLC-Refinery

Location : With in Refinery Plant, North

Monitor Period : 01-08 Nov 2024

Analyzer Model : Thermo 48C

Station No : SS2-09

Serial No : 362

Site Operator : Mr. Siwanon Kulawong

Calibrator Model : Teledyne 700E

Serial No : 587

Calibration Gas Cylinder I.D.: EB0102326

Certified Date : 05 Jan 2024


Cal Concentration (ppb) : 0,100,200,400

Expire Date : 04 Jan 2025

Time	CO Concentration (ppm)						
	01-02 Nov 2024	02-03 Nov 2024	03-04 Nov 2024	04-05 Nov 2024	05-06 Nov 2024	06-07 Nov 2024	07-08 Nov 2024
08:00 - 09:00	1.4	0.4	1.7	0.5	0.6	0.5	0.8
09:00 - 10:00	0.6	0.7	0.6	1.4	0.9	1.1	0.7
10:00 - 11:00	1.3	0.3	1.2	1.4	0.7	1.5	1.0
11:00 - 12:00	1.1	1.4	0.7	1.6	0.7	0.8	0.5
12:00 - 13:00	0.7	1.3	0.3	1.5	1.2	0.5	0.4
13:00 - 14:00	1.1	0.6	1.2	0.4	0.3	1.4	0.5
14:00 - 15:00	1.2	1.6	0.9	1.0	0.4	1.1	0.7
15:00 - 16:00	1.2	1.6	1.0	1.2	1.7	1.6	1.7
16:00 - 17:00	1.3	1.2	0.7	0.6	0.5	0.8	0.5
17:00 - 18:00	1.5	0.4	1.4	0.6	1.4	0.4	1.2
18:00 - 19:00	0.4	0.7	1.6	1.5	0.6	0.8	0.8
19:00 - 20:00	0.6	1.1	1.7	0.3	1.5	1.6	0.4
20:00 - 21:00	0.8	0.4	0.3	1.0	1.4	0.3	1.2
21:00 - 22:00	1.3	1.5	1.3	1.0	0.4	1.5	1.1
22:00 - 23:00	1.6	0.3	0.4	0.7	0.6	1.3	0.9
23:00 - 00:00	0.6	0.7	1.2	0.7	1.3	1.1	1.1
00:00 - 01:00	0.4	1.0	1.5	0.7	1.1	1.3	0.8
01:00 - 02:00	0.7	0.7	0.8	0.8	1.0	1.3	0.9
02:00 - 03:00	1.3	0.4	1.5	1.1	1.4	0.7	1.4
03:00 - 04:00	0.8	1.3	1.6	1.7	1.6	0.3	1.2
04:00 - 05:00	1.7	1.2	0.6	1.6	1.2	1.1	1.2
05:00 - 06:00	0.6	1.1	1.3	1.5	0.8	0.6	1.5
06:00 - 07:00	0.7	0.7	0.5	0.3	1.2	0.7	0.6
07:00 - 08:00	1.2	1.1	1.3	1.6	0.7	0.6	1.6
Average-24Hr*	1.0	0.9	1.1	1.0	1.0	1.0	0.9
Max-1Hr	1.7	1.6	1.7	1.7	1.7	1.6	1.7
Min-1Hr	0.4	0.3	0.3	0.3	0.3	0.3	0.4
Standard-1Hr	30 ppm(34.2 mg/cu.m)						
Standard-24Hr							

Remark : * Average time between 08:00-08:00


 (Miss Katesarin Vorradetwittaya)
 Environmental Scientist


 (Miss Preeda Somjai)
 Technical Management Team



Ambient Air Monitoring Results : Carbon monoxide

MTR-SPRC PLC-Refinery

Location : Map Ta Phut New Town

Monitor Period : 01-08 Nov 2024

Analyzer Model : Teledyne 300E

Station No : SS2-05

Serial No : 1077

Site Operator : Mr. Siwanon Kulawong

Calibrator Model : Teledyne 700E

Serial No : 587

Calibration Gas Cylinder I.D.: EB0102326

Certified Date : 05 Jan 2024


Cal Concentration (ppb) : 0,100,200,400

Expire Date : 04 Jan 2025

Time	CO Concentration (ppm)						
	01-02 Nov 2024	02-03 Nov 2024	03-04 Nov 2024	04-05 Nov 2024	05-06 Nov 2024	06-07 Nov 2024	07-08 Nov 2024
10:00 - 11:00	1.2	1.5	0.3	0.3	0.6	0.9	0.5
11:00 - 12:00	1.0	0.9	0.2	0.7	1.4	0.9	0.2
12:00 - 13:00	1.4	0.3	0.4	0.5	1.1	0.8	1.2
13:00 - 14:00	0.6	0.4	0.7	0.8	0.7	1.3	0.6
14:00 - 15:00	0.7	0.6	0.9	1.3	0.8	1.0	0.4
15:00 - 16:00	1.1	1.3	1.4	0.2	1.1	0.4	1.2
16:00 - 17:00	0.6	0.9	0.8	0.4	0.6	0.5	1.0
17:00 - 18:00	0.5	1.3	0.2	1.1	1.0	1.0	0.7
18:00 - 19:00	1.1	1.3	1.3	1.3	0.6	0.5	0.3
19:00 - 20:00	1.1	0.6	0.5	1.3	0.6	0.5	1.2
20:00 - 21:00	0.3	1.2	1.4	0.8	0.7	1.2	0.7
21:00 - 22:00	1.5	0.4	0.7	1.0	1.0	0.4	1.0
22:00 - 23:00	0.7	0.6	1.1	0.5	0.7	0.5	1.1
23:00 - 00:00	1.1	0.8	1.5	1.2	0.8	0.8	1.1
00:00 - 01:00	0.8	0.8	0.7	0.7	0.3	1.4	1.3
01:00 - 02:00	0.4	0.3	0.9	0.9	1.1	0.4	1.2
02:00 - 03:00	0.6	0.4	0.6	1.0	0.4	1.0	1.3
03:00 - 04:00	1.4	1.0	0.5	1.1	1.4	0.3	0.4
04:00 - 05:00	0.2	0.3	0.4	0.3	0.4	1.3	1.5
05:00 - 06:00	1.4	0.6	1.2	0.7	0.4	1.0	1.0
06:00 - 07:00	0.9	0.9	0.5	1.2	0.8	0.4	1.4
07:00 - 08:00	1.0	0.8	1.5	0.8	0.5	0.5	1.2
08:00 - 09:00	1.1	1.5	1.3	1.3	1.2	0.8	0.9
09:00 - 10:00	0.3	0.2	1.3	0.5	0.6	1.2	1.5
Average-24Hr*	0.9	0.8	0.8	0.8	0.8	0.8	1.0
Max-1Hr	1.5	1.5	1.5	1.3	1.4	1.4	1.5
Min-1Hr	0.2	0.2	0.2	0.2	0.3	0.3	0.2
Standard-1Hr	30 ppm(34.2 mg/cu.m)						
Standard-24Hr							

Remark : * Average time between 10:00-10:00


 (Miss Katesarin Vorradetwittaya)
 Environmental Scientist


 (Miss Preeda Somjai)
 Technical Management Team



Ambient Air Monitoring Results : Carbon monoxide

MTR-SPRC PLC-Refinery

Location : Ban Plong Community

Monitor Period : 01-08 Nov 2024

Analyzer Model : Thermo 48C

Station No : SS2-01

Serial No : 0507710894

Site Operator : Mr. Siwanon Kulawong

Calibrator Model : Teledyne 700E

Serial No : 587

Calibration Gas Cylinder I.D.: EB0102326

Certified Date : 05 Jan 2024

Cal Concentration (ppb) : 0,100,200,400

Expire Date : 04 Jan 2025

Time	CO Concentration (ppm)						
	01-02 Nov 2024	02-03 Nov 2024	03-04 Nov 2024	04-05 Nov 2024	05-06 Nov 2024	06-07 Nov 2024	07-08 Nov 2024
09:00 - 10:00	1.1	0.4	0.4	0.5	1.0	0.9	1.2
10:00 - 11:00	0.7	0.9	1.0	0.9	1.0	0.4	0.6
11:00 - 12:00	0.2	0.8	0.9	1.0	0.6	1.1	0.7
12:00 - 13:00	0.6	0.9	0.4	1.2	0.3	0.7	0.9
13:00 - 14:00	1.1	0.9	0.5	0.9	0.2	1.0	0.5
14:00 - 15:00	1.2	0.8	0.7	0.8	1.2	0.6	0.8
15:00 - 16:00	0.6	0.3	0.5	1.2	0.6	0.4	0.3
16:00 - 17:00	0.9	0.9	0.4	0.7	1.2	0.4	1.2
17:00 - 18:00	0.3	0.9	0.7	0.7	1.1	0.3	0.9
18:00 - 19:00	0.4	0.6	0.5	0.5	0.5	0.3	1.0
19:00 - 20:00	0.6	0.5	0.8	1.1	1.1	0.3	0.3
20:00 - 21:00	0.4	0.2	1.2	0.8	0.4	0.7	0.2
21:00 - 22:00	0.5	0.8	1.0	0.6	0.4	0.5	0.5
22:00 - 23:00	0.2	0.3	1.1	0.6	0.3	1.1	1.1
23:00 - 00:00	0.6	0.2	0.7	1.2	0.6	0.4	0.2
00:00 - 01:00	0.3	0.6	0.2	0.5	0.9	0.6	1.2
01:00 - 02:00	1.1	0.8	1.2	1.2	0.5	1.1	0.7
02:00 - 03:00	0.2	0.4	0.6	0.8	1.1	0.7	0.5
03:00 - 04:00	0.7	0.4	0.9	0.9	0.7	0.3	0.8
04:00 - 05:00	1.1	0.6	0.6	1.1	0.9	0.7	0.9
05:00 - 06:00	0.9	1.0	1.1	0.3	1.1	1.2	0.5
06:00 - 07:00	1.2	0.3	1.2	0.6	0.7	0.2	0.8
07:00 - 08:00	1.1	1.1	0.3	0.5	0.4	0.7	1.1
08:00 - 09:00	0.9	0.6	0.8	0.5	0.2	1.0	0.9
Average-24Hr*	0.7	0.6	0.7	0.8	0.7	0.7	0.7
Max-1Hr	1.2	1.1	1.2	1.2	1.2	1.2	1.2
Min-1Hr	0.2	0.2	0.2	0.3	0.2	0.2	0.2
Standard-1Hr	30 ppm(34.2 mg/cu.m)						
Standard-24Hr	-						

Remark : * Average time between 09:00-09:00

(Miss Katesarin Vorradetwittaya)
Environmental Scientist

Preeda S.
(Miss Preeda Somjai)
Technical Management Team



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AMBIENT AIR QUALITY ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REFERENCE NO.	: SPRC-224003-COA-Amb/H ₂ S
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING DATE	: 03, 06-07/11/2024
RECEIVE DATE	: 13/11/2024	ANALYTICAL DATE	: 20/11/2024
REPORT DATE	: 25/11/2024	SAMPLE CONDITION	: Normal
INSTRUMENT	: Impingment Absorption	SITE OPERATOR	: Mr.Siwanon Kulawong
CALIBRATOR MODEL	: Defender 520-H	SERIAL NO.	: 114069
STATION DESCRIPTION	1. Within the Refinery Plant 2. Map Ta Phut New Town 3. Ban Plong Community		

PARAMETER	SAMPLING DATE	UNIT	ND (Non-detectable)	RESULTS			REFERENCE METHODS
				1	2	3	
Hydrogen Sulfide (1 hr)	03/11/2024	ppm	<0.001	ND	ND	ND	Intersociety Committee
	06/11/2024	ppm	<0.001	ND	ND	ND	Method 701
	07/11/2024	ppm	<0.001	ND	ND	ND	

(Miss Pornnapa Budthum)

Analyst

(Miss Narisa Poowasanpeth)

Technical Management Team

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AMBIENT AIR QUALITY ANALYSIS REPORT

CLIENT NAME : Star Petroleum Refining Public Co., Ltd. REF. NO. : SPRC-224003-COA-Amb/TSP
SAMPLING BY : SECOT Co., Ltd. SAMPLING DATE : 01-08/11/2024
RECEIVED DATE : 13/11/2024 ANALYTICAL DATE : 14-15/11/2024
REPORT DATE : 25/11/2024 SAMPLE CONDITION : Normal
OPERATOR : Mr.Siwanon Kulawong
STATION DESCRIPTION : 1. Within the Refinery Plant 2. Map Ta Phut New Town
3. Ban Plong Community

PARAMETER	SAMPLING DATE	UNITS	RESULTS			STANDARD*	REFERENCE METHODS
			1	2	3		
TSP (24 hr.)	01-02/11/2024	mg/m ³	0.068	0.051	0.071	0.330	High Volume
	02-03/11/2024	mg/m ³	0.054	0.056	0.058		Air Sampler/
	03-04/11/2024	mg/m ³	0.049	0.058	0.070		Gravimetric
	04-05/11/2024	mg/m ³	0.035	0.044	0.053		Method
	05-06/11/2024	mg/m ³	0.031	0.041	0.051		
	06-07/11/2024	mg/m ³	0.042	0.044	0.046		
	07-08/11/2024	mg/m ³	0.037	0.036	0.046		



(Miss Pornnapa Budthum)

Analyst



(Miss Narisa Poowasanpetch)

Technical Management Team

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AMBIENT AIR QUALITY ANALYSIS REPORT

CLIENT NAME : Star Petroleum Refining Public Co., Ltd. REF. NO. : SPRC-224003-COA-Amb/PM10
SAMPLING BY : SECOT Co., Ltd. SAMPLING DATE : 01-08/11/2024
RECEIVED DATE : 13/11/2024 ANALYTICAL DATE : 14-15/11/2024
REPORT DATE : 25/11/2024 SAMPLE CONDITION : Normal
OPERATOR : Mr.Siwanon Kulawong
STATION DESCRIPTION : 1. Within the Refinery Plant 2. Map Ta Phut New Town
3. Ban Plong Community

PARAMETER	SAMPLING DATE	UNITS	RESULTS			STANDARD*	REFERENCE METHODS
			1	2	3		
PM-10 (24 hr.)	01-02/11/2024	mg/m ³	0.034	0.046	0.058	0.120	High Volume
	02-03/11/2024	mg/m ³	0.038	0.043	0.055		Air Sampler
	03-04/11/2024	mg/m ³	0.036	0.047	0.060		(Hi-Vol PM-10
	04-05/11/2024	mg/m ³	0.030	0.041	0.051		Size Selective Inlet)
	05-06/11/2024	mg/m ³	0.019	0.035	0.050		Gravimetric
	06-07/11/2024	mg/m ³	0.022	0.038	0.043		Method
	07-08/11/2024	mg/m ³	0.021	0.030	0.044		

(Miss Pornnapa Budthum)

Analyst

(Miss Narisa Poowasanpetch)

Technical Management Team

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AMBIENT AIR QUALITY ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No.	: 1357/67
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Subatmospheric Pressure Sampling
SAMPLING DATE	: 02-03/07/2024	ANALYTICAL DATE	: 08/07/2024
SAMPLING TIME	: 13:15-13:40	SAMPLE CONDITION	: Normal
RECEIVED DATE	: 04/07/2024	FILE CODE	: 224003_TO-15_July
REPORT DATE	: 12/07/2024		

Compound	SAMPLING LOCATION				STANDARD* (µg/m ³)
	Non Detection				
	Map Ta Phut New Town				
	ppbv	µg/m ³	ppbv	µg/m ³	
Benzene	0.004	0.013	0.44	1.41	7.6

Methods for the Determination of Toxic Organic Compound in Ambient Air, 2nd : EPA Methods TO-15,1999

Siriwan Chimsa-nga
(Miss Siriwan Chimsa-nga)

Analyst

Araya Tipparuk

(Mrs. Araya Tipparuk)

Technical Management Team

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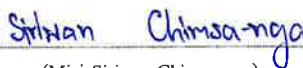
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AMBIENT AIR QUALITY ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No.	: 1544/67
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Subatmospheric Pressure Sampling
SAMPLING DATE	: 01-02/08/2024	ANALYTICAL DATE	: 07/08/2024
SAMPLING TIME	: 10:33-10:33	SAMPLE CONDITION	: Normal
RECEIVED DATE	: 03/08/2024	FILE CODE	: 224003_TO-15_August
REPORT DATE	: 17/08/2024		

Compound	SAMPLING LOCATION				STANDARD* (µg/m ³)
	Non Detection		Map Ta Phut New Town		
	ppbv	µg/m ³	ppbv	µg/m ³	
Benzene	0.004	0.013	0.64	2.04	7.6

Methods for the Determination of Toxic Organic Compound in Ambient Air, 2nd : EPA Methods TO-15,1999


(Miss Siriwan Chimsa-nga)
Analyst


(Mrs. Araya Tipparuk)
Technical Management Team

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AMBIENT AIR QUALITY ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No.	: 1821/67
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Subatmospheric Pressure Sampling
SAMPLING DATE	: 02-03/09/2024	ANALYTICAL DATE	: 05-06/09/2024
SAMPLING TIME	: 11:54-12:30	SAMPLE CONDITION	: Normal
RECEIVED DATE	: 04/09/2024	FILE CODE	: 224003_TO-September
REPORT DATE	: 09/09/2024		

Compound	SAMPLING LOCATION				STANDARD* (µg/m ³)
	Non Detection		Map Ta Phut New Town		
	ppbv	µg/m ³	ppbv	µg/m ³	
Benzene	0.004	0.013	0.64	2.04	7.6

Methods for the Determination of Toxic Organic Compound in Ambient Air, 2nd : EPA Methods TO-15, 1999

Siriwan Chimsa-nga
(Miss Siriwan Chimsa-nga)

Analyst

Araya Tipparuk

(Mrs. Araya Tipparuk)

Technical Management Team

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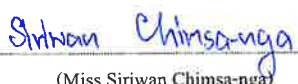
TEL. (662) 959-3600 FAX (662) 959-3535 Website : secot.co.th E-mail : envserv@secot.co.th

AMBIENT AIR QUALITY ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No.	: 2079/67
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Subatmospheric Pressure Sampling
SAMPLING DATE	: 07-08/10/2024	ANALYTICAL DATE	: 16/10/2024
SAMPLING TIME	: 13:12-13:01	SAMPLE CONDITION	: Normal
RECEIVED DATE	: 09/10/2024	FILE CODE	: 224003 TO-15 October
REPORT DATE	: 21/10/2024		

Compound	SAMPLING LOCATION				STANDARD* (µg/m ³)
	Non Detection		Map Ta Phut New Town		
	ppbv	µg/m ³	ppbv	µg/m ³	
Benzene	0.004	0.013	0.53	1.69	7.6

Methods for the Determination of Toxic Organic Compound in Ambient Air, 2nd : EPA Methods TO-15, 1999


(Miss Siriwan Chimsa-nga)
Analyst


(Mrs. Araya Tipparuk)
Technical Management Team

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TEL. (662) 959-3600 FAX (662) 959-3535 Website : secot.co.th E-mail : envserv@secot.co.th

AMBIENT AIR QUALITY ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No.	: 2239/67
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Subatmospheric Pressure Sampling
SAMPLING DATE	: 04-05/11/2024	ANALYTICAL DATE	: 15/11/2024
SAMPLING TIME	: 15:26-15:40	SAMPLE CONDITION	: Normal
RECEIVED DATE	: 06/11/2024	FILE CODE	: 224003_TO-15_November
REPORT DATE	: 18/11/2024		

Compound	SAMPLING LOCATION				STANDARD* (µg/m ³)
	Non Detection		Map Ta Phut New Town		
	ppbv	µg/m ³	ppbv	µg/m ³	
Benzene	0.004	0.013	0.44	1.41	7.6

Methods for the Determination of Toxic Organic Compound in Ambient Air, 2nd : EPA Methods TO-15,1999


(Miss Siriwan Chimsa-nga)

Analyst



(Mrs. Araya Tipparuk)

Technical Management Team

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AMBIENT AIR QUALITY ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No.	: 2517/67
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Subatmospheric Pressure Sampling
SAMPLING DATE	: 02-03/12/2024	ANALYTICAL DATE	: 11/12/2024
SAMPLING TIME	: 09:40-09:40	SAMPLE CONDITION	: Normal
RECEIVED DATE	: 04/12/2024	FILE CODE	: 224003 TO-15 December
REPORT DATE	: 14/12/2024		

Compound	SAMPLING LOCATION				STANDARD* (µg/m ³)
	Non Detection		Map Ta Phut New Town		
	ppbv	µg/m ³	ppbv	µg/m ³	
Benzene	0.004	0.013	0.53	1.69	7.6

Methods for the Determination of Toxic Organic Compound in Ambient Air, 2nd : EPA Methods TO-15,1999

Siriwan Chimsa-nga

(Miss Siriwan Chimsa-nga)

Analyst

Araya Tipparuk

(Mrs. Araya Tipparuk)

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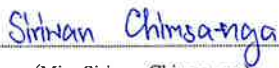
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AMBIENT AIR QUALITY ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No.	: 1357/67
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Subatmospheric Pressure Sampling
SAMPLING DATE	: 02-03/07/2024	ANALYTICAL DATE	: 08/07/2024
SAMPLING TIME	: 12:45-12:00	SAMPLE CONDITION	: Normal
RECEIVED DATE	: 04/07/2024	FILE CODE	: 224003_TO-15_July
REPORT DATE	: 12/07/2024		

Compound	SAMPLING LOCATION				STANDARD* (µg/m ³)
	Non Detection		Ban Plong Community		
	ppbv	µg/m ³	ppbv	µg/m ³	
Benzene	0.004	0.013	0.46	1.47	7.6

Methods for the Determination of Toxic Organic Compound in Ambient Air, 2nd : EPA Methods TO-15,1999


(Miss Siriwan Chimsa-nga)
Analyst


(Mrs. Araya Tipparuk)
Technical Management Team

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AMBIENT AIR QUALITY ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No.	: 1544/67
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Subatmospheric Pressure Sampling
SAMPLING DATE	: 01-02/08/2024	ANALYTICAL DATE	: 07/08/2024
SAMPLING TIME	: 10:08-10:09	SAMPLE CONDITION	: Normal
RECEIVED DATE	: 03/08/2024	FILE CODE	: 224003_TO-15_August
REPORT DATE	: 17/08/2024		

Compound	SAMPLING LOCATION				STANDARD* (µg/m ³)
	Non Detection		Ban Plong Community		
	ppbv	µg/m ³	ppbv	µg/m ³	
Benzene	0.004	0.013	1.10	3.52	7.6

Methods for the Determination of Toxic Organic Compound in Ambient Air, 2nd : EPA Methods TO-15, 1999

Siriwan Chimsa-nga
(Miss Siriwan Chimsa-nga)

Analyst

Araya Tipparuk

(Mrs. Araya Tipparuk)

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AMBIENT AIR QUALITY ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No.	: 1821/67
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Subatmospheric Pressure Sampling
SAMPLING DATE	: 02-03/09/2024	ANALYTICAL DATE	: 05-06/09/2024
SAMPLING TIME	: 11:20-12:20	SAMPLE CONDITION	: Normal
RECEIVED DATE	: 04/09/2024	FILE CODE	: 224003_TO-September
REPORT DATE	: 09/09/2024		

Compound	SAMPLING LOCATION				STANDARD* (µg/m ³)
	Non Detection		Ban Plong Community		
	ppbv	µg/m ³	ppbv	µg/m ³	
	ppbv	µg/m ³	ppbv	µg/m ³	
Benzene	0.004	0.013	0.64	2.04	7.6

Methods for the Determination of Toxic Organic Compound in Ambient Air, 2nd : EPA Methods TO-15,1999


(Miss Siriwan Chimsa-nga)

Analyst



(Mrs. Araya Tipparuk)

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AMBIENT AIR QUALITY ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No.	: 2079/67
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Subatmospheric Pressure Sampling
SAMPLING DATE	: 07-08/10/2024	ANALYTICAL DATE	: 16/10/2024
SAMPLING TIME	: 12:24-12:07	SAMPLE CONDITION	: Normal
RECEIVED DATE	: 09/10/2024	FILE CODE	: 224003_TO-15_October
REPORT DATE	: 21/10/2024		

Compound	SAMPLING LOCATION				STANDARD* (µg/m ³)
	Non Detection		Ban Plong Community		
	ppbv	µg/m ³	ppbv	µg/m ³	
Benzene	0.004	0.013	0.59	1.88	7.6

Methods for the Determination of Toxic Organic Compound in Ambient Air, 2nd : EPA Methods TO-15, 1999


(Miss Siriwan Chimsa-nga)

Analyst


(Mrs. Araya Tipparuk)

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CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No.	: 2239/67
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Subatmospheric Pressure Sampling
SAMPLING DATE	: 04-05/11/2024	ANALYTICAL DATE	: 15/11/2024
SAMPLING TIME	: 15:16-15:27	SAMPLE CONDITION	: Normal
RECEIVED DATE	: 06/11/2024	FILE CODE	: 224003_TO-15_November
REPORT DATE	: 18/11/2024		

Compound	SAMPLING LOCATION				STANDARD* (µg/m ³)
	Non Detection		Ban Plong Community		
	ppbv	µg/m ³	ppbv	µg/m ³	
Benzene	0.004	0.013	0.51	1.63	7.6

Methods for the Determination of Toxic Organic Compound in Ambient Air, 2nd : EPA Methods TO-15,1999


(Miss Siriwan Chimsa-nga)

Analyst



(Mrs. Araya Tipparuk)

Technical Management Team

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AMBIENT AIR QUALITY ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No.	: 2517/67
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Subatmospheric Pressure Sampling
SAMPLING DATE	: 02-03/12/2024	ANALYTICAL DATE	: 11/12/2024
SAMPLING TIME	: 15:13-14:20	SAMPLE CONDITION	: Normal
RECEIVED DATE	: 04/12/2024	FILE CODE	: 224003 TO-15 December
REPORT DATE	: 14/12/2024		

Compound	SAMPLING LOCATION				STANDARD* (µg/m ³)
	Non Detection		Ban Plong Community		
	ppbv	µg/m ³	ppbv	µg/m ³	
Benzene	0.004	0.013	0.73	2.33	7.6

Methods for the Determination of Toxic Organic Compound in Ambient Air, 2nd : EPA Methods TO-15,1999

Siriwan Chimsa-nga
(Miss Siriwan Chimsa-nga)

Analyst

Araya Tipparuk

(Mrs. Araya Tipparuk)

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STACK EMISSION ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REFERENCE NO.	: Refinery-224003-COA-Stk/PM
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING DATE	: 06/11/2024
RECEIVED DATE	: 08/11/2024	ANALYTICAL DATE	: 11-12/11/2024
REPORT DATE	: 25/11/2024	SAMPLE CONDITION	: Normal
STACK LOCATION	: RFCCU Stack	OPERATOR	: Mr. Song Hengchwankun
SOURCE DESCRIPTION	: Combustion	FUEL TYPE	: Natural Gas + Refinery Fuel Gas

STACK DESCRIPTION

Height	: 70.0	m	Gas Velocity	: 15.4	m/s
Diameter	: 3.2	m	Flow rate ⁽¹⁾	: 3,529	Ncu.m/min
Temperature	: 277.7	°C	Excess Oxygen	: 3.5	%

PARAMETER	UNIT	RESULTS ⁽¹⁾		ASSIGNED VALUE ⁽²⁾	STANDARD ⁽³⁾	REFERENCE METHODS
		3.5 % O ₂	7 % O ₂			
Particulate Matter	mg/Ncu.m	75.5	60.3	240	320	US. EPA Method 5


(Miss Pornnapa Budthum)

Analyst

REG.NO.จ-239-จ-0018



(Miss Narisa Poowasanpetch)

Technical Management Team

REG.NO.จ-239-ท-0010

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3. ⁽¹⁾ At standard pressure of 760 mmHg and temperature of 25 °C, dry basis.

4. ⁽²⁾ Assigned value in EIA Report Expansion 3 of Refinery Plant, B.E. 2561 (2018).

5. ⁽³⁾ Notification of the Ministry of Natural Resources and Environment B.E.2554 (2011).



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STACK EMISSION ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REFERENCE NO.	: Refinery-224003-COA-Stk/HM
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING DATE	: 06/11/2024
RECEIVED DATE	: 08/11/2024	ANALYTICAL DATE	: 08-18/11/2024
REPORT DATE	: 26/11/2024	SAMPLE CONDITION	: Normal
STACK LOCATION	: RFCCU Stack	OPERATOR	: Mr. Song Hengchwankun
SOURCE DESCRIPTION	: Combustion	FUEL TYPE	: Natural Gas + Refinery Fuel Gas

STACK DESCRIPTION

Height	: 70.0	m	Gas Velocity	: 15.4	m/s
Diameter	: 3.2	m	Flow rate ⁽¹⁾	: 3,529	Ncu.m/min
Temperature	: 277.7	°C	Excess Oxygen	: 3.5	%

PARAMETER	UNIT	RESULTS ⁽¹⁾		ASSIGNED VALUE ⁽²⁾	STANDARD ⁽³⁾	REFERENCE METHODS
		3.5 % O ₂	7 % O ₂			
Mercury	mg/Ncu.m	<0.0003	<0.0002	2.4	2.4	US. EPA Method 29
Lead	mg/Ncu.m	0.04	0.03	5.0	5.0	US. EPA Method 29

(Miss Krisana Chanthoom)

Analyst

REG.NO.จ-239-จ-0017

(Miss Narisa Poowasanpetch)

Technical Management Team

REG.NO.จ-239-ก-0010

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5. ⁽³⁾ Notification of the Ministry of Natural Resources and Environment B.E.2554 (2011).



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STACK EMISSION ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REFERENCE NO.	: Refinery-224003-COA-Stk/CEMs
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING DATE	: 06/11/2024
RECEIVED DATE	: 15/11/2024	ANALYTICAL DATE	: 18/11/2024-10/12/2024
REPORT DATE	: 10/12/2024	SAMPLE CONDITION	: Normal
STACK LOCATION	: RFCCU Stack	OPERATOR	: Mr. Song Hengchwankun
SOURCE DESCRIPTION	: Combustion	FUEL TYPE	: Natural Gas + Refinery Fuel Gas

STACK DESCRIPTION

Height	: 70.0	m	Gas Velocity	: 15.4	m/s
Diameter	: 3.2	m	Flow rate ⁽¹⁾	: 3,529	Ncu.m/min
Temperature	: 277.7	°C	Excess Oxygen	: 3.5	%

PARAMETER	CONCENTRATIONS				EMISSION RATE		REFERENCE METHOD
	RESULTS ⁽¹⁾		ASSIGNED VALUE ⁽²⁾	STANDARD ⁽³⁾	RESULT	ASSIGNED VALUE ⁽²⁾	
	3.5 % O ₂	7 % O ₂	7 % O ₂	7 % O ₂			
	ppm	ppm	ppm	ppm	g/s	g/s	
Sulfur Dioxide (SO ₂)	334.6	267.8	700	700	51.514	149.000	US.EPA Method 6C
Oxide of Nitrogen (NO _x)	136.5	109.3	250	400	15.105	23.010	US.EPA Method 7E
Carbon Monoxide (CO)	322.0	257.7	554	690	21.689	24.320	US.EPA Method 10

(Miss Katesarin Vorradetwittaya)

Environmental Scientist

(Miss Preeda Somjai)

Technical Management Team

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5. ⁽³⁾ Notification of the Ministry of Natural Resources and Environment B.E.2554 (2011).

The Monitoring Result of Emission Concentration
RFCCU
STAR PETROLEUM REFINING PUBLIC CO., LTD.
November 6, 2024

Run Number	Oxygen content (%)		Oxide of Nitrogen (ppm)		
	RM Stack Gas Conc	Corrected Gas Conc	RM Stack Gas Conc	Corrected Gas Conc @Actual O2	Corrected Gas Conc @7% O2
1	3.55	3.49	135.78	135.93	108.53
2	3.57	3.51	135.71	135.82	108.56
3	3.67	3.60	137.66	137.73	110.66
Average	3.60	3.53	136.38	136.49	109.25

Run Number	Oxygen content (%)		Sulfur dioxide (ppm)		
	RM Stack Gas Conc	Corrected Gas Conc	RM Stack Gas Conc	Corrected Gas Conc @Actual O2	Corrected Gas Conc @7% O2
1	3.55	3.49	323.27	323.42	258.22
2	3.57	3.51	333.68	333.86	266.86
3	3.67	3.60	346.21	346.42	278.34
Average	3.60	3.53	334.39	334.57	267.78

Run Number	Oxygen content (%)		Carbonmonoxide (ppm)		
	RM Stack Gas Conc	Corrected Gas Conc	RM Stack Gas Conc	Corrected Gas Conc @Actual O2	Corrected Gas Conc @7% O2
1	3.55	3.49	326.02	326.28	260.50
2	3.57	3.51	325.31	325.55	260.22
3	3.67	3.60	313.84	314.05	252.33
Average	3.60	3.53	321.72	321.96	257.69

STAR PETROLEUM REFINING PUBLIC CO., LTD.

EMISSION TEST RESULT

Date: November 6, 2024 Start time: 10:45 AM O₂ instrument Model: AMI 70 NO_x instrument Model: API 200 AH SO₂ instrument Model: API 100 AH CO instrument Model: THERMO 48 C Fuel Type : Fuel Gas	Run # : 1 Location : RFCCU Finish time : 11:05 AM Serial No.: 161212-13 Serial No.: 314 Serial No.: 058 Serial No.: 78253-388 Test Operator : Song H.
---	--

Time, min	O ₂ (%)	NO _x (ppm)	SO ₂ (ppm)	CO (ppm)
10:45 AM	3.79	140.63	333.77	322.35
10:46 AM	3.77	137.57	327.39	323.58
10:47 AM	3.67	135.67	326.20	324.93
10:48 AM	3.62	136.38	325.06	326.75
10:49 AM	3.61	137.02	321.20	328.63
10:50 AM	3.56	136.15	320.16	329.10
10:51 AM	3.50	134.15	326.78	330.71
10:52 AM	3.42	133.32	332.98	329.82
10:53 AM	3.35	134.45	332.75	330.93
10:54 AM	3.35	135.70	325.93	329.11
10:55 AM	3.37	134.84	327.93	327.92
10:56 AM	3.41	135.17	321.59	326.78
10:57 AM	3.49	133.56	311.78	326.73
10:58 AM	3.54	133.06	310.05	323.64
10:59 AM	3.54	132.53	308.84	324.70
11:00 AM	3.62	135.05	311.87	323.69
11:01 AM	3.66	135.92	320.19	321.53
11:02 AM	3.55	135.96	320.39	321.32
11:03 AM	3.59	138.10	320.66	323.65
11:04 AM	3.63	137.53	331.53	324.91
11:05 AM	3.59	138.55	331.52	325.59
Average	3.55	135.78	323.27	326.02

Signature 
 Miss Katesarin Vorradetwittaya
 Environmental Scientist

STAR PETROLEUM REFINING PUBLIC CO., LTD.

EMISSION TEST RESULT

Date: <u>November 6, 2024</u> Start time: <u>11:06 AM</u> O₂ instrument Model: <u>AMI 70</u> NO_x instrument Model: <u>API 200 AH</u> SO₂ instrument Model: <u>API 100 AH</u> CO instrument Model: <u>THERMO 48 C</u> Fuel Type : <u>Fuel Gas</u>	Run # : <u>2</u> Location : <u>RFCCU</u> Finish time : <u>11:26 AM</u> Serial No.: <u>161212-13</u> Serial No.: <u>314</u> Serial No.: <u>058</u> Serial No.: <u>78253-388</u> Test Operator : <u>Song H.</u>
--	--

Time, min	O ₂ (%)	NO _x (ppm)	SO ₂ (ppm)	CO (ppm)
11:06 AM	3.48	142.04	321.02	326.01
11:07 AM	3.50	140.53	318.49	326.31
11:08 AM	3.60	138.82	320.11	326.57
11:09 AM	3.64	138.20	327.83	327.33
11:10 AM	3.67	136.47	330.75	327.86
11:11 AM	3.70	136.40	336.30	328.90
11:12 AM	3.71	136.50	334.51	327.82
11:13 AM	3.75	135.61	321.37	327.87
11:14 AM	3.81	135.50	327.04	327.54
11:15 AM	3.79	135.35	333.02	326.48
11:16 AM	3.70	135.44	332.13	325.63
11:17 AM	3.51	135.13	342.14	327.63
11:18 AM	3.38	134.93	344.37	326.73
11:19 AM	3.37	133.99	339.45	325.21
11:20 AM	3.44	130.51	334.96	325.93
11:21 AM	3.42	129.66	337.61	324.66
11:22 AM	3.42	131.97	342.28	322.08
11:23 AM	3.41	133.45	345.94	321.30
11:24 AM	3.42	135.41	343.09	320.84
11:25 AM	3.56	136.84	337.92	319.51
11:26 AM	3.62	137.09	336.94	319.30
Average	3.57	135.71	333.68	325.31


 Signature _____
Miss Katesarin Vorradetwittaya
Environmental Scientist

STAR PETROLEUM REFINING PUBLIC CO., LTD.

EMISSION TEST RESULT

Date: November 6, 2024 Start time: 11:27 AM O₂ instrument Model: AMI 70 NO_x instrument Model: API 200 AH SO₂ instrument Model: API 100 AH CO instrument Model: THERMO 48 C Fuel Type : Fuel Gas	Run # : 3 Location : RFCCU Finish time : 11:47 AM Serial No.: 161212-13 Serial No.: 314 Serial No.: 058 Serial No.: 78253-388 Test Operator : Song H.
---	--

Time, min	O ₂ (%)	NO _x (ppm)	SO ₂ (ppm)	CO (ppm)
11:27 AM	3.71	136.45	340.62	318.75
11:28 AM	3.69	136.78	344.67	316.72
11:29 AM	3.71	137.28	341.08	315.75
11:30 AM	3.77	137.44	335.02	314.48
11:31 AM	3.92	137.86	342.58	314.98
11:32 AM	3.94	137.54	350.36	315.67
11:33 AM	3.89	138.55	360.27	315.49
11:34 AM	3.78	138.33	358.83	316.71
11:35 AM	3.72	138.43	354.00	316.04
11:36 AM	3.67	138.85	351.78	314.86
11:37 AM	3.70	138.08	350.05	312.99
11:38 AM	3.67	138.28	356.27	313.50
11:39 AM	3.62	138.02	354.50	310.68
11:40 AM	3.62	137.98	351.58	311.44
11:41 AM	3.64	134.24	341.47	312.43
11:42 AM	3.62	131.98	347.91	313.12
11:43 AM	3.59	133.21	346.30	311.53
11:44 AM	3.58	135.51	345.99	312.18
11:45 AM	3.45	143.71	346.18	310.60
11:46 AM	3.38	141.82	324.90	309.21
11:47 AM	3.37	140.57	326.10	313.59
Average	3.67	137.66	346.21	313.84

Signature



Miss Katesarin Vorradetwittaya

Environmental Scientist



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TEL : +66(0) 2959-3600 FAX : +66(0) 2959-3535 E-mail : envserv@secot.co.th

STACK EMISSION ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REFERENCE NO.	: Refinery-224003-COA-Stk/PM
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING DATE	: 05/11/2024
RECEIVED DATE	: 08/11/2024	ANALYTICAL DATE	: 11-12/11/2024
REPORT DATE	: 25/11/2024	SAMPLE CONDITION	: Normal
STACK LOCATION	: CDU Stack	OPERATOR	: Mr. Song Hengchwankun
SOURCE DESCRIPTION	: Combustion	FUEL TYPE	: Natural Gas + Refinery Fuel Gas

STACK DESCRIPTION

Height	: 63.2	m	Gas Velocity	: 9.0	m/s
Diameter	: 3.0	m	Flow rate ⁽¹⁾	: 2,204	Ncu.m/min
Temperature	: 181.2	°C	Excess Oxygen	: 4.0	%

PARAMETER	UNIT	RESULTS ⁽¹⁾		ASSIGNED VALUE ⁽²⁾	STANDARD ⁽³⁾	REFERENCE METHODS
		4.0 % O ₂	7 % O ₂			
Particulate Matter	mg/Ncu.m	5.6	4.6	60	60	US. EPA Method 5



(Miss Pornnapa Budthum)

Analyst

REG.NO.จ-239-จ-0018



(Miss Narisa Poowasanpetch)

Technical Management Team

REG.NO.จ-239-ท-0010

Remark : 1. Reported analysis refers to submitted sample only.

2. This report shall not be reproduced, except in full, without official approval.

3. ⁽¹⁾ At standard pressure of 760 mmHg and temperature of 25 °C, dry basis.

4. ⁽²⁾ Assigned value in EIA Report Expansion 3 of Refinery Plant, B.E. 2561 (2018).

5. ⁽³⁾ Notification of the Ministry of Natural Resources and Environment B.E.2554 (2011).



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TEL : +66(0) 2959-3600 FAX : +66(0) 2959-3535 E-mail : envserv@secot.co.th

STACK EMISSION ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REFERENCE NO.	: Refinery-224003-COA-Stk/CEMs
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING DATE	: 05/11/2024
RECEIVED DATE	: 15/11/2024	ANALYTICAL DATE	: 18/11/2024-10/12/2024
REPORT DATE	: 10/12/2024	SAMPLE CONDITION	: Normal
STACK LOCATION	: CDU Stack	OPERATOR	: Mr. Song Hengchwankun
SOURCE DESCRIPTION	: Combustion	FUEL TYPE	: Natural Gas + Refinery Fuel Gas

STACK DESCRIPTION

Height	: 63.2	m	Gas Velocity	: 9.0	m/s
Diameter	: 3.0	m	Flow rate ⁽¹⁾	: 2,204	Ncu.m/min
Temperature	: 181.2	°C	Excess Oxygen	: 4.0	%

PARAMETER	CONCENTRATIONS				EMISSION RATE		REFERENCE METHOD
	RESULTS ⁽¹⁾		ASSIGNED	STANDARD ⁽³⁾	RESULT	ASSIGNED	
	VALUE ⁽²⁾		VALUE ⁽²⁾			VALUE ⁽²⁾	
	4.0 % O ₂	7 % O ₂	7 % O ₂	7 % O ₂			
	ppm	ppm	ppm	ppm	g/s	g/s	
Sulfur Dioxide (SO ₂)	3.5	2.9	60	60	0.337	1.820	US.EPA Method 6C
Oxide of Nitrogen (NO _x)	20.6	16.9	25	200	1.424	2.000	US.EPA Method 7E
Carbon Monoxide (CO)	0.1	0.1	100	690	0.004	0.500	US.EPA Method 10

(Miss Katesarin Vorradetwittaya)

Environmental Scientist

(Miss Preeda Somjai)

Technical Management Team

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5. ⁽³⁾ Notification of the Ministry of Natural Resources and Environment B.E.2554 (2011).

The Monitoring Result of Emission Concentration
CDU
STAR PETROLEUM REFINING PUBLIC CO., LTD.
November 5, 2024

Run Number	Oxygen content (%)		Oxide of Nitrogen (ppm)		
	RM Stack Gas Conc	Corrected Gas Conc	RM Stack Gas Conc	Corrected Gas Conc @Actual O2	Corrected Gas Conc @7% O2
1	4.02	3.94	20.77	20.70	16.97
2	4.08	3.99	20.80	20.73	17.04
3	4.01	3.92	20.51	20.45	16.74
Average	4.04	3.95	20.69	20.63	16.92

Run Number	Oxygen content (%)		Sulfur dioxide (ppm)		
	RM Stack Gas Conc	Corrected Gas Conc	RM Stack Gas Conc	Corrected Gas Conc @Actual O2	Corrected Gas Conc @7% O2
1	4.02	3.94	3.27	3.21	2.63
2	4.08	3.99	3.62	3.55	2.92
3	4.01	3.92	3.92	3.85	3.15
Average	4.04	3.95	3.60	3.54	2.90

Run Number	Oxygen content (%)		Carbonmonoxide (ppm)		
	RM Stack Gas Conc	Corrected Gas Conc	RM Stack Gas Conc	Corrected Gas Conc @Actual O2	Corrected Gas Conc @7% O2
1	4.02	3.94	0.12	0.06	0.05
2	4.08	3.99	0.12	0.07	0.06
3	4.01	3.92	0.12	0.07	0.06
Average	4.04	3.95	0.12	0.07	0.05

STAR PETROLEUM REFINING PUBLIC CO., LTD.

EMISSION TEST RESULT

Date: November 5, 2024 Start time: 10:50 AM O₂ instrument Model: AMI 70 NO_x instrument Model: TELEDYNE 200 EM SO₂ instrument Model: API 100 AH CO instrument Model: THERMO 48 C Fuel Type : Natural Gas	Run # : 1 Location : CDU Finish time : 11:10 AM Serial No.: 121121-9 Serial No.: 433 Serial No.: 118 Serial No.: 0412106049 Test Operator : Kittipong T.
---	---

Time, min	O ₂ (%)	NO _x (ppm)	SO ₂ (ppm)	CO (ppm)
10:50 AM	4.03	20.82	3.05	0.40
10:51 AM	4.02	20.85	3.06	0.02
10:52 AM	4.00	20.75	3.13	0.12
10:53 AM	4.01	20.63	3.11	0.12
10:54 AM	4.02	20.58	3.15	0.06
10:55 AM	3.97	20.54	3.20	0.08
10:56 AM	3.96	20.54	3.20	0.12
10:57 AM	3.94	20.64	3.20	0.09
10:58 AM	3.94	20.83	3.26	0.12
10:59 AM	3.91	21.04	3.29	0.12
11:00 AM	3.95	21.12	3.28	0.12
11:01 AM	4.09	21.05	3.32	0.12
11:02 AM	4.10	20.93	3.35	0.12
11:03 AM	4.08	20.92	3.38	0.12
11:04 AM	4.03	20.91	3.36	0.08
11:05 AM	4.06	20.71	3.38	0.12
11:06 AM	3.96	20.61	3.37	0.13
11:07 AM	4.09	20.69	3.39	0.10
11:08 AM	4.09	20.67	3.42	0.13
11:09 AM	4.03	20.74	3.36	0.10
11:10 AM	4.14	20.51	3.44	0.13
Average	4.02	20.77	3.27	0.12


 Signature _____
Miss Katesarin Vorradetwittaya
Environmental Scientist

STAR PETROLEUM REFINING PUBLIC CO., LTD.

EMISSION TEST RESULT

Date: <u>November 5, 2024</u> Start time: <u>11:11 AM</u> O₂ instrument Model: <u>AMI 70</u> NO_x instrument Model: <u>TELEDYNE 200 EM</u> SO₂ instrument Model: <u>API 100 AH</u> CO instrument Model: <u>THERMO 48 C</u> Fuel Type : <u>Natural Gas</u>	Run # : <u>2</u> Location : <u>CDU</u> Finish time : <u>11:31 AM</u> Serial No.: <u>121121-9</u> Serial No.: <u>433</u> Serial No.: <u>118</u> Serial No.: <u>0412106049</u> Test Operator : <u>Kittipong T.</u>
--	---

Time, min	O ₂ (%)	NO _x (ppm)	SO ₂ (ppm)	CO (ppm)
11:11 AM	4.12	20.32	3.51	0.13
11:12 AM	4.11	20.55	3.47	0.13
11:13 AM	4.08	20.73	3.50	0.13
11:14 AM	4.05	20.88	3.49	0.13
11:15 AM	3.96	21.04	3.56	0.13
11:16 AM	4.02	21.05	3.57	0.13
11:17 AM	4.13	20.71	3.54	0.13
11:18 AM	4.13	20.58	3.61	0.13
11:19 AM	4.15	20.70	3.65	0.10
11:20 AM	4.18	20.61	3.64	0.13
11:21 AM	4.12	20.46	3.62	0.13
11:22 AM	4.08	20.68	3.60	0.13
11:23 AM	4.07	20.78	3.62	0.13
11:24 AM	4.09	20.58	3.61	0.13
11:25 AM	4.05	20.44	3.66	0.11
11:26 AM	3.94	20.70	3.72	0.12
11:27 AM	4.01	21.04	3.72	0.12
11:28 AM	4.06	21.18	3.74	0.05
11:29 AM	4.10	21.38	3.72	0.12
11:30 AM	4.14	21.25	3.72	0.12
11:31 AM	4.15	21.21	3.72	0.12
Average	4.08	20.80	3.62	0.12


 Signature _____
Miss Katesarin Vorradetwittaya
Environmental Scientist

STAR PETROLEUM REFINING PUBLIC CO., LTD.

EMISSION TEST RESULT

Date: <u>November 5, 2024</u> Start time: <u>11:32 AM</u> O₂ instrument Model: <u>AMI 70</u> NO_x instrument Model: <u>TELEDYNE 200 EM</u> SO₂ instrument Model: <u>API 100 AH</u> CO instrument Model: <u>THERMO 48 C</u> Fuel Type : <u>Natural Gas</u>	Run # : <u>3</u> Location : <u>CDU</u> Finish time : <u>11:52 AM</u> Serial No.: <u>121121-9</u> Serial No.: <u>433</u> Serial No.: <u>118</u> Serial No.: <u>0412106049</u> Test Operator : <u>Kittipong T.</u>
--	---

Time, min	O ₂ (%)	NO _x (ppm)	SO ₂ (ppm)	CO (ppm)
11:32 AM	4.14	21.32	3.78	0.12
11:33 AM	4.09	21.05	3.72	0.12
11:34 AM	4.01	20.73	3.80	0.12
11:35 AM	3.98	20.69	3.90	0.12
11:36 AM	4.00	20.79	3.88	0.08
11:37 AM	4.09	20.70	3.90	0.12
11:38 AM	4.05	20.49	3.95	0.12
11:39 AM	4.03	20.49	3.95	0.12
11:40 AM	4.10	20.39	3.84	0.12
11:41 AM	4.06	20.30	3.92	0.12
11:42 AM	3.98	20.38	3.95	0.12
11:43 AM	3.96	20.46	3.98	0.07
11:44 AM	3.97	20.56	3.97	0.10
11:45 AM	3.98	20.48	3.92	0.12
11:46 AM	3.89	20.38	3.95	0.12
11:47 AM	3.94	20.35	3.98	0.13
11:48 AM	3.92	20.14	3.94	0.13
11:49 AM	3.88	20.26	3.99	0.13
11:50 AM	3.95	20.27	3.96	0.13
11:51 AM	4.04	20.17	3.99	0.13
11:52 AM	4.10	20.27	3.97	0.13
Average	4.01	20.51	3.92	0.12


 Signature _____
Miss Katesarin Vorradetwittaya
Environmental Scientist



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STACK EMISSION ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REFERENCE NO.	: Refinery-224003-COA-Stk/PM
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING DATE	: 04/11/2024
RECEIVED DATE	: 08/11/2024	ANALYTICAL DATE	: 11-12/11/2024
REPORT DATE	: 25/11/2024	SAMPLE CONDITION	: Normal
STACK LOCATION	: VDU Stack	OPERATOR	: Mr. Song Hengchwankun
SOURCE DESCRIPTION	: Combustion	FUEL TYPE	: Natural Gas + Refinery Fuel Gas

STACK DESCRIPTION

Height	: 54.0	m	Gas Velocity	: 10.8	m/s
Diameter	: 2.0	m	Flow rate ⁽¹⁾	: 1,171	Ncu.m/min
Temperature	: 185.1	°C	Excess Oxygen	: 4.4	%

PARAMETER	UNIT	RESULTS ⁽¹⁾		ASSIGNED VALUE ⁽²⁾	STANDARD ⁽³⁾	REFERENCE METHODS
		4.4 % O ₂	7 % O ₂			
Particulate Matter	mg/Ncu.m	2.1	1.8	60	60	US. EPA Method 5


(Miss Pornnapa Budthum)

Analyst

REG.NO.จ-239-จ-0018


(Miss Narisa Poowasanpetch)

Technical Management Team

REG.NO.จ-239-ค-0010

Remark : 1. Reported analysis refers to submitted sample only.

2. This report shall not be reproduced, except in full, without official approval.

3. ⁽¹⁾ At standard pressure of 760 mmHg and temperature of 25 °C, dry basis.

4. ⁽²⁾ Assigned value in EIA Report Expansion 3 of Refinery Plant, B.E. 2561 (2018).

5. ⁽³⁾ Notification of the Ministry of Natural Resources and Environment B.E.2554 (2011).



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TEL : +66(0) 2959-3600 FAX : +66(0) 2959-3535 E-mail : envserv@secot.co.th

STACK EMISSION ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REFERENCE NO.	: Refinery-224003-COA-Stk/CEMs
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING DATE	: 04/11/2024
RECEIVED DATE	: 15/11/2024	ANALYTICAL DATE	: 18/11/2024-10/12/2024
REPORT DATE	: 10/12/2024	SAMPLE CONDITION	: Normal
STACK LOCATION	: VDU Stack	OPERATOR	: Mr. Song Hengchwankun
SOURCE DESCRIPTION	: Combustion	FUEL TYPE	: Natural Gas + Refinery Fuel Gas


STACK DESCRIPTION

Height	: 54.0	m	Gas Velocity	: 10.8	m/s
Diameter	: 2.0	m	Flow rate ⁽¹⁾	: 1,171	Ncu.m/min
Temperature	: 185.1	°C	Excess Oxygen	: 4.4	%

PARAMETER	CONCENTRATIONS				EMISSION RATE		REFERENCE METHOD
	RESULTS ⁽¹⁾		ASSIGNED	STANDARD ⁽³⁾	RESULT	ASSIGNED	
	VALUE ⁽²⁾		VALUE ⁽²⁾			VALUE ⁽²⁾	
	4.4 % O ₂	7 % O ₂	7 % O ₂	7 % O ₂	g/s	g/s	
	ppm	ppm	ppm	ppm			
Sulfur Dioxide (SO ₂)	2.9	2.5	60	60	0.148	1.510	US.EPA Method 6C
Oxide of Nitrogen (NO _x)	19.3	16.3	25	200	0.709	0.900	US.EPA Method 7E
Carbon Monoxide (CO)	0.1	0.1	100	690	0.002	0.500	US.EPA Method 10


(Miss Katesarin Vorradetwittaya)

Environmental Scientist


(Miss Preeda Somjai)

Technical Management Team

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5. ⁽³⁾ Notification of the Ministry of Natural Resources and Environment B.E.2554 (2011).

The Monitoring Result of Emission Concentration
VDU
STAR PETROLEUM REFINING PUBLIC CO., LTD.
November 4, 2024

Run Number	Oxygen content (%)		Oxide of Nitrogen (ppm)		
	RM Stack Gas Conc	Corrected Gas Conc	RM Stack Gas Conc	Corrected Gas Conc @Actual O2	Corrected Gas Conc @7% O2
1	4.58	4.50	19.36	19.32	16.37
2	4.47	4.40	19.36	19.32	16.28
3	4.45	4.38	19.43	19.39	16.31
Average	4.50	4.43	19.39	19.34	16.32

Run Number	Oxygen content (%)		Sulfur dioxide (ppm)		
	RM Stack Gas Conc	Corrected Gas Conc	RM Stack Gas Conc	Corrected Gas Conc @Actual O2	Corrected Gas Conc @7% O2
1	4.58	4.50	3.09	3.04	2.58
2	4.47	4.40	2.98	2.93	2.47
3	4.45	4.38	2.86	2.82	2.37
Average	4.50	4.43	2.98	2.93	2.47

Run Number	Oxygen content (%)		Carbonmonoxide (ppm)		
	RM Stack Gas Conc	Corrected Gas Conc	RM Stack Gas Conc	Corrected Gas Conc @Actual O2	Corrected Gas Conc @7% O2
1	4.58	4.50	0.17	0.14	0.12
2	4.47	4.40	0.17	0.13	0.11
3	4.45	4.38	0.18	0.14	0.12
Average	4.50	4.43	0.17	0.14	0.12

STAR PETROLEUM REFINING PUBLIC CO., LTD.

EMISSION TEST RESULT

Date: November 4, 2024 Start time: 11:00 AM O₂ instrument Model: AMI 70 NO_x instrument Model: API 200 AH SO₂ instrument Model: API 100 AH CO instrument Model: THERMO 48 C Fuel Type : Natural Gas	Run # : 1 Location : VDU Finish time : 11:20 AM Serial No.: 161212-13 Serial No.: 314 Serial No.: 058 Serial No.: 78253-388 Test Operator : Song H.
--	--

Time, min	O ₂ (%)	NO _x (ppm)	SO ₂ (ppm)	CO (ppm)
11:00 AM	4.68	19.36	3.15	0.18
11:01 AM	4.66	19.26	3.15	0.18
11:02 AM	4.62	19.32	3.16	0.18
11:03 AM	4.61	19.39	3.19	0.18
11:04 AM	4.61	19.34	3.14	0.18
11:05 AM	4.62	19.23	3.06	0.17
11:06 AM	4.59	19.16	2.99	0.18
11:07 AM	4.53	19.17	3.04	0.17
11:08 AM	4.58	19.16	3.07	0.17
11:09 AM	4.56	19.25	3.11	0.17
11:10 AM	4.57	19.33	3.08	0.17
11:11 AM	4.58	19.31	3.07	0.17
11:12 AM	4.58	19.33	3.03	0.17
11:13 AM	4.56	19.32	3.02	0.17
11:14 AM	4.58	19.36	3.09	0.17
11:15 AM	4.54	19.50	3.11	0.17
11:16 AM	4.48	19.59	3.09	0.17
11:17 AM	4.52	19.56	3.10	0.17
11:18 AM	4.56	19.55	3.08	0.18
11:19 AM	4.57	19.57	3.09	0.19
11:20 AM	4.56	19.50	3.09	0.18
Average	4.58	19.36	3.09	0.17

Signature 
 Miss Katesarin Vorradetwittaya
 Environmental Scientist

STAR PETROLEUM REFINING PUBLIC CO., LTD.

EMISSION TEST RESULT

Date: <u>November 4, 2024</u> Start time: <u>11:21 AM</u> O₂ instrument Model: <u>AMI 70</u> NO_x instrument Model: <u>API 200 AH</u> SO₂ instrument Model: <u>API 100 AH</u> CO instrument Model: <u>THERMO 48 C</u> Fuel Type : <u>Natural Gas</u>	Run # : <u>2</u> Location : <u>VDU</u> Finish time : <u>11:41 AM</u> Serial No.: <u>161212-13</u> Serial No.: <u>314</u> Serial No.: <u>058</u> Serial No.: <u>78253-388</u> Test Operator : <u>Song H.</u>
---	--

Time, min	O ₂ (%)	NO _x (ppm)	SO ₂ (ppm)	CO (ppm)
11:21 AM	4.50	19.49	3.03	0.18
11:22 AM	4.42	19.46	3.03	0.17
11:23 AM	4.42	19.49	3.03	0.18
11:24 AM	4.47	19.37	2.98	0.18
11:25 AM	4.48	19.38	3.02	0.18
11:26 AM	4.43	19.34	3.01	0.18
11:27 AM	4.42	19.56	3.00	0.17
11:28 AM	4.47	19.48	2.97	0.18
11:29 AM	4.45	19.43	2.97	0.17
11:30 AM	4.46	19.28	2.96	0.17
11:31 AM	4.48	19.37	3.00	0.17
11:32 AM	4.49	18.86	3.00	0.17
11:33 AM	4.54	19.45	2.94	0.17
11:34 AM	4.48	19.33	2.97	0.17
11:35 AM	4.52	19.09	3.00	0.17
11:36 AM	4.50	19.21	2.89	0.17
11:37 AM	4.54	19.40	2.98	0.17
11:38 AM	4.52	19.46	2.95	0.17
11:39 AM	4.49	19.35	2.93	0.17
11:40 AM	4.43	19.41	2.92	0.17
11:41 AM	4.45	19.39	2.99	0.17
Average	4.47	19.36	2.98	0.17


 Signature _____
Miss Katesarin Vorradetwittaya
Environmental Scientist

STAR PETROLEUM REFINING PUBLIC CO., LTD.

EMISSION TEST RESULT

Date: <u>November 4, 2024</u> Start time: <u>11:42 AM</u> O₂ instrument Model: <u>AMI 70</u> NO_x instrument Model: <u>API 200 AH</u> SO₂ instrument Model: <u>API 100 AH</u> CO instrument Model: <u>THERMO 48 C</u> Fuel Type : <u>Natural Gas</u>	Run # : <u>3</u> Location : <u>VDU</u> Finish time : <u>12:02 PM</u> Serial No.: <u>161212-13</u> Serial No.: <u>314</u> Serial No.: <u>058</u> Serial No.: <u>78253-388</u> Test Operator : <u>Song H.</u>
---	--

Time, min	O ₂ (%)	NO _x (ppm)	SO ₂ (ppm)	CO (ppm)
11:42 AM	4.48	19.38	3.00	0.18
11:43 AM	4.49	19.57	2.89	0.18
11:44 AM	4.48	19.39	2.87	0.18
11:45 AM	4.50	19.57	2.87	0.18
11:46 AM	4.48	19.81	2.88	0.19
11:47 AM	4.42	19.27	2.88	0.18
11:48 AM	4.43	19.52	2.82	0.19
11:49 AM	4.39	19.49	2.83	0.18
11:50 AM	4.42	19.35	2.82	0.19
11:51 AM	4.48	19.50	2.81	0.17
11:52 AM	4.48	19.35	2.85	0.17
11:53 AM	4.48	19.38	2.89	0.17
11:54 AM	4.47	19.32	2.89	0.17
11:55 AM	4.43	19.28	2.86	0.17
11:56 AM	4.40	19.46	2.82	0.17
11:57 AM	4.43	19.34	2.85	0.17
11:58 AM	4.44	19.53	2.84	0.17
11:59 AM	4.43	19.44	2.85	0.17
12:00 PM	4.48	19.42	2.86	0.17
12:01 PM	4.44	19.32	2.85	0.17
12:02 PM	4.42	19.41	2.83	0.17
Average	4.45	19.43	2.86	0.18


 Signature _____
Miss Katesarin Vorradetwittaya
Environmental Scientist



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TEL : +66(0) 2959-3600 FAX : +66(0) 2959-3535 E-mail : envserv@secot.co.th

STACK EMISSION ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REFERENCE NO.	: Refinery-224003-COA-Stk/PM
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING DATE	: 07/11/2024
RECEIVED DATE	: 08/11/2024	ANALYTICAL DATE	: 11-12/11/2024
REPORT DATE	: 25/11/2024	SAMPLE CONDITION	: Normal
STACK LOCATION	: NHTU/CCRU Stack	OPERATOR	: Mr. Song Hengchwankun
SOURCE DESCRIPTION	: Combustion	FUEL TYPE	: Natural Gas + Refinery Fuel Gas

STACK DESCRIPTION

Height	: 65.0	m	Gas Velocity	: 7.7	m/s
Diameter	: 3.1	m	Flow rate ⁽¹⁾	: 1,879	Ncu.m/min
Temperature	: 214.3	°C	Excess Oxygen	: 5.2	%

PARAMETER	UNIT	RESULTS ⁽¹⁾		ASSIGNED VALUE ⁽²⁾	STANDARD ⁽³⁾	REFERENCE METHODS
		5.2 % O ₂	7 % O ₂			
Particulate Matter	mg/Ncu.m	3.1	2.7	60	60	US. EPA Method 5


(Miss Pornnapa Budthum)

Analyst

REG.NO.จ-239-ก-0018


(Miss Narisa Poowasanpetch)

Technical Management Team

REG.NO.จ-239-ก-0010

Remark : 1. Reported analysis refers to submitted sample only.

2. This report shall not be reproduced, except in full, without official approval.

3. ⁽¹⁾ At standard pressure of 760 mmHg and temperature of 25 °C, dry basis.

4. ⁽²⁾ Assigned value in EIA Report Expansion 3 of Refinery Plant, B.E. 2561 (2018).

5. ⁽³⁾ Notification of the Ministry of Natural Resources and Environment B.E.2554 (2011).



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TEL : +66(0) 2959-3600 FAX : +66(0) 2959-3535 E-mail : envserv@secot.co.th

STACK EMISSION ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REFERENCE NO.	: Refinery-224003-COA-Stk/CEMs
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING DATE	: 07/11/2024
RECEIVED DATE	: 15/11/2024	ANALYTICAL DATE	: 18/11/2024-10/12/2024
REPORT DATE	: 10/12/2024	SAMPLE CONDITION	: Normal
STACK LOCATION	: NHTU/CCRU Stack	OPERATOR	: Mr. Song Hengchwankun
SOURCE DESCRIPTION	: Combustion	FUEL TYPE	: Natural Gas + Refinery Fuel Gas

STACK DESCRIPTION

Height	: 65.0	m	Gas Velocity	: 7.7	m/s
Diameter	: 3.1	m	Flow rate ⁽¹⁾	: 1,879	Ncu.m/min
Temperature	: 214.3	°C	Excess Oxygen	: 5.2	%

PARAMETER	CONCENTRATIONS				EMISSION RATE		REFERENCE METHOD
	RESULTS ⁽¹⁾		ASSIGNED VALUE ⁽²⁾	STANDARD ⁽³⁾	RESULT	ASSIGNED VALUE ⁽²⁾	
	5.2 % O ₂	7 % O ₂	7 % O ₂	7 % O ₂			
	ppm	ppm	ppm	ppm	g/s	g/s	
Sulfur Dioxide (SO ₂)	3.9	3.5	60	60	0.320	1.500	US.EPA Method 6C
Oxide of Nitrogen (NO _x)	39.5	35.1	120	200	2.327	2.830	US.EPA Method 7E
Carbon Monoxide (CO)	0.2	0.2	100	690	0.007	0.100	US.EPA Method 10

(Miss Katesarin Vorradetwittaya)

Environmental Scientist

(Miss Preeda Somjai)

Technical Management Team

Remark : 1. Reported analysis refers to submitted sample only.

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3. ⁽¹⁾ At standard pressure of 760 mmHg and temperature of 25 °C, dry basis.

4. ⁽²⁾ Assigned value in EIA Report Expansion 3 of Refinery Plant, B.E. 2561 (2018).

5. ⁽³⁾ Notification of the Ministry of Natural Resources and Environment B.E.2554 (2011).

The Monitoring Result of Emission Concentration
NHTU
STAR PETROLEUM REFINING PUBLIC CO., LTD.
November 7, 2024

Run Number	Oxygen content (%)		Oxide of Nitrogen (ppm)		
	RM Stack Gas Conc	Corrected Gas Conc	RM Stack Gas Conc	Corrected Gas Conc @Actual O2	Corrected Gas Conc @7% O2
1	5.29	5.24	39.37	39.37	34.95
2	5.28	5.22	39.66	39.66	35.16
3	5.27	5.21	39.56	39.56	35.05
Average	5.28	5.22	39.53	39.53	35.05

Run Number	Oxygen content (%)		Sulfur dioxide (ppm)		
	RM Stack Gas Conc	Corrected Gas Conc	RM Stack Gas Conc	Corrected Gas Conc @Actual O2	Corrected Gas Conc @7% O2
1	5.29	5.24	3.98	3.93	3.49
2	5.28	5.22	3.93	3.88	3.44
3	5.27	5.21	3.92	3.87	3.43
Average	5.28	5.22	3.94	3.89	3.45

Run Number	Oxygen content (%)		Carbonmonoxide (ppm)		
	RM Stack Gas Conc	Corrected Gas Conc	RM Stack Gas Conc	Corrected Gas Conc @Actual O2	Corrected Gas Conc @7% O2
1	5.29	5.24	0.38	0.35	0.31
2	5.28	5.22	0.15	0.12	0.11
3	5.27	5.21	0.14	0.12	0.11
Average	5.28	5.22	0.23	0.20	0.17

STAR PETROLEUM REFINING PUBLIC CO., LTD.

EMISSION TEST RESULT

Date: <u>November 7, 2024</u> Start time: <u>10:40 AM</u> O₂ instrument Model: <u>AMI 70</u> NO_x instrument Model: <u>Teledyne 200 EM</u> SO₂ instrument Model: <u>API 100 AH</u> CO instrument Model: <u>THERMO 48 C</u> Fuel Type : <u>Natural Gas</u>	Run # : <u>1</u> Location : <u>NHTU</u> Finish time : <u>11:00 AM</u> Serial No.: <u>121121-10</u> Serial No.: <u>433</u> Serial No.: <u>118</u> Serial No.: <u>0412106049</u> Test Operator : <u>Song H.</u>
--	--

Time, min	O ₂ (%)	NO _x (ppm)	SO ₂ (ppm)	CO (ppm)
10:40 AM	5.21	38.58	3.83	0.74
10:41 AM	5.19	38.96	3.94	0.80
10:42 AM	5.22	39.10	4.11	0.57
10:43 AM	5.23	39.35	4.12	0.54
10:44 AM	5.27	39.47	4.11	0.40
10:45 AM	5.41	39.51	4.02	0.54
10:46 AM	5.40	39.60	3.98	0.34
10:47 AM	5.36	39.63	3.97	0.44
10:48 AM	5.34	39.63	3.99	0.51
10:49 AM	5.32	39.64	4.00	0.37
10:50 AM	5.38	39.63	3.95	0.27
10:51 AM	5.38	39.61	3.96	0.37
10:52 AM	5.35	39.46	3.92	0.41
10:53 AM	5.35	39.36	3.92	0.24
10:54 AM	5.33	39.39	3.96	0.34
10:55 AM	5.31	39.40	3.94	0.24
10:56 AM	5.26	39.29	3.92	0.27
10:57 AM	5.26	39.28	3.98	0.14
10:58 AM	5.22	39.22	4.00	0.11
10:59 AM	5.15	39.24	4.05	0.21
11:00 AM	5.16	39.44	3.94	0.11
Average	5.29	39.37	3.98	0.38

Signature 
Miss Katesarin Vorradetwittaya
Environmental Scientist

STAR PETROLEUM REFINING PUBLIC CO., LTD.

EMISSION TEST RESULT

Date: <u>November 7, 2024</u> Start time: <u>11:01 AM</u> O₂ instrument Model: <u>AMI 70</u> NO_x instrument Model: <u>Teledyne 200 EM</u> SO₂ instrument Model: <u>API 100 AH</u> CO instrument Model: <u>THERMO 48 C</u> Fuel Type : <u>Natural Gas</u>	Run # : <u>2</u> Location : <u>NHTU</u> Finish time : <u>11:21 AM</u> Serial No.: <u>121121-10</u> Serial No.: <u>433</u> Serial No.: <u>118</u> Serial No.: <u>0412106049</u> Test Operator : <u>Song H.</u>
--	--

Time, min	O ₂ (%)	NO _x (ppm)	SO ₂ (ppm)	CO (ppm)
11:01 AM	5.21	39.68	3.91	0.21
11:02 AM	5.28	39.73	3.96	0.21
11:03 AM	5.27	39.64	3.96	0.47
11:04 AM	5.24	39.53	3.92	0.14
11:05 AM	5.21	39.59	3.88	0.14
11:06 AM	5.19	39.78	3.88	0.17
11:07 AM	5.26	39.75	3.93	0.21
11:08 AM	5.35	39.57	3.89	0.24
11:09 AM	5.27	39.41	3.86	0.11
11:10 AM	5.24	39.43	3.91	0.11
11:11 AM	5.28	39.59	3.97	0.11
11:12 AM	5.29	39.74	3.95	0.11
11:13 AM	5.19	39.79	4.03	0.14
11:14 AM	5.25	39.81	4.02	0.11
11:15 AM	5.35	39.83	3.97	0.11
11:16 AM	5.37	39.77	3.94	0.11
11:17 AM	5.36	39.78	3.93	0.11
11:18 AM	5.35	39.73	3.90	0.11
11:19 AM	5.36	39.70	3.90	0.11
11:20 AM	5.31	39.61	3.86	0.11
11:21 AM	5.26	39.40	3.87	0.11
Average	5.28	39.66	3.93	0.15


 Signature _____
Miss Katesarin Vorradetwittaya
Environmental Scientist

STAR PETROLEUM REFINING PUBLIC CO., LTD.

EMISSION TEST RESULT

Date: <u>November 7, 2024</u> Start time: <u>11:22 AM</u> O₂ instrument Model: <u>AMI 70</u> NO_x instrument Model: <u>Teledyne 200 EM</u> SO₂ instrument Model: <u>API 100 AH</u> CO instrument Model: <u>THERMO 48 C</u> Fuel Type : <u>Natural Gas</u>	Run # : <u>3</u> Location : <u>NHTU</u> Finish time : <u>11:42 AM</u> Serial No.: <u>121121-10</u> Serial No.: <u>433</u> Serial No.: <u>118</u> Serial No.: <u>0412106049</u> Test Operator : <u>Song H.</u>
--	--

Time, min	O ₂ (%)	NO _x (ppm)	SO ₂ (ppm)	CO (ppm)
11:22 AM	5.27	39.30	3.95	0.11
11:23 AM	5.19	39.27	3.93	0.11
11:24 AM	5.20	39.36	3.84	0.11
11:25 AM	5.25	39.62	3.90	0.11
11:26 AM	5.26	39.82	3.89	0.11
11:27 AM	5.32	39.79	3.88	0.11
11:28 AM	5.30	39.63	3.91	0.11
11:29 AM	5.31	39.67	3.91	0.11
11:30 AM	5.30	39.69	3.83	0.11
11:31 AM	5.26	39.57	3.87	0.11
11:32 AM	5.26	39.53	3.92	0.11
11:33 AM	5.28	39.55	3.93	0.11
11:34 AM	5.35	39.62	3.93	0.14
11:35 AM	5.37	39.73	3.93	0.26
11:36 AM	5.35	39.60	3.92	0.19
11:37 AM	5.30	39.44	3.84	0.22
11:38 AM	5.17	39.40	3.92	0.25
11:39 AM	5.18	39.46	3.95	0.19
11:40 AM	5.28	39.53	4.02	0.14
11:41 AM	5.26	39.58	4.02	0.10
11:42 AM	5.29	39.58	4.01	0.22
Average	5.27	39.56	3.92	0.14


 Signature _____
Miss Katesarin Vorradetwittaya
Environmental Scientist



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TEL : +66(0) 2959-3600 FAX : +66(0) 2959-3535 E-mail : envserv@secot.co.th

STACK EMISSION ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REFERENCE NO.	: Refinery-224003-COA-Stk/PM
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING DATE	: 13/11/2024
RECEIVED DATE	: 14/11/2024	ANALYTICAL DATE	: 15-16/11/2024
REPORT DATE	: 25/11/2024	SAMPLE CONDITION	: Normal
STACK LOCATION	: DHTU Stack	OPERATOR	: Mr. Song Hengchwankun
SOURCE DESCRIPTION	: Combustion	FUEL TYPE	: Natural Gas + Refinery Fuel Gas

STACK DESCRIPTION


Height	: 36.2	m	Gas Velocity	: 13.4	m/s
Diameter	: 1.6	m	Flow rate ⁽¹⁾	: 670.8	Ncu.m/min
Temperature	: 352.1	°C	Excess Oxygen	: 6.4	%

PARAMETER	UNIT	RESULTS ⁽¹⁾		ASSIGNED VALUE ⁽²⁾	STANDARD ⁽³⁾	REFERENCE METHODS
		6.4 % O ₂	7 % O ₂			
Particulate Matter	mg/Ncu.m	2.1	2.0	60	60	US. EPA Method 5


(Miss Pornnapa Budthum)

Analyst

REG.NO.จ-239-จ-0018


(Miss Narisa Poowasanpetch)

Technical Management Team

REG.NO.จ-239-ค-0010

Remark : 1. Reported analysis refers to submitted sample only.

2. This report shall not be reproduced, except in full, without official approval.

3. ⁽¹⁾ At standard pressure of 760 mmHg and temperature of 25 °C, dry basis.

4. ⁽²⁾ Assigned value in EIA Report Expansion 3 of Refinery Plant, B.E. 2561 (2018).

5. ⁽³⁾ Notification of the Ministry of Natural Resources and Environment B.E.2554 (2011).



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TEL : +66(0) 2959-3600 FAX : +66(0) 2959-3535 E-mail : envserv@secot.co.th

STACK EMISSION ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REFERENCE NO.	: Refinery-224003-COA-Stk/CEMs
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING DATE	: 13/11/2024
RECEIVED DATE	: 15/11/2024	ANALYTICAL DATE	: 18/11/2024-10/12/2024
REPORT DATE	: 10/12/2024	SAMPLE CONDITION	: Normal
STACK LOCATION	: DHTU Stack	OPERATOR	: Mr. Song Hengchwankun
SOURCE DESCRIPTION	: Combustion	FUEL TYPE	: Natural Gas + Refinery Fuel Gas

STACK DESCRIPTION

Height	: 36.2	m	Gas Velocity	: 13.4	m/s
Diameter	: 1.6	m	Flow rate ⁽¹⁾	: 670.8	Ncu.m/min
Temperature	: 352.1	°C	Excess Oxygen	: 6.4	%

PARAMETER	CONCENTRATIONS				EMISSION RATE		REFERENCE METHOD
	RESULTS ⁽¹⁾		ASSIGNED	STANDARD ⁽³⁾	RESULT	ASSIGNED	
			VALUE ⁽²⁾				
	6.4 % O ₂	7 % O ₂	7 % O ₂	7 % O ₂			
	ppm	ppm	ppm	ppm	g/s	g/s	
Sulfur Dioxide (SO ₂)	1.5	1.5	60	60	0.044	1.000	US.EPA Method 6C
Oxide of Nitrogen (NO _x)	41.8	40	120	200	0.879	0.920	US.EPA Method 7E
Carbon Monoxide (CO)	0.6	0.5	100	690	0.008	0.100	US.EPA Method 10

(Miss Katesarin Vorradetwittaya)

Environmental Scientist

(Miss Preeda Somjai)

Technical Management Team

Remark : 1. Reported analysis refers to submitted sample only.

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3. ⁽¹⁾ At standard pressure of 760 mmHg and temperature of 25 °C, dry basis.

4. ⁽²⁾ Assigned value in EIA Report Expansion 3 of Refinery Plant, B.E. 2561 (2018).

5. ⁽³⁾ Notification of the Ministry of Natural Resources and Environment B.E.2554 (2011).

The Monitoring Result of Emission Concentration
DHTU
STAR PETROLEUM REFINING PUBLIC CO., LTD.
November 13, 2024

Run Number	Oxygen content (%)		Oxide of Nitrogen (ppm)		
	RM Stack Gas Conc	Corrected Gas Conc	RM Stack Gas Conc	Corrected Gas Conc @Actual O2	Corrected Gas Conc @7% O2
1	6.51	6.44	41.48	41.48	39.87
2	6.42	6.36	41.99	41.99	40.14
3	6.32	6.28	42.00	42.00	39.93
Average	6.42	6.36	41.82	41.82	39.98

Run Number	Oxygen content (%)		Sulfur dioxide (ppm)		
	RM Stack Gas Conc	Corrected Gas Conc	RM Stack Gas Conc	Corrected Gas Conc @Actual O2	Corrected Gas Conc @7% O2
1	6.51	6.44	1.35	1.34	1.29
2	6.42	6.36	1.46	1.44	1.38
3	6.32	6.28	1.86	1.83	1.74
Average	6.42	6.36	1.55	1.54	1.47

Run Number	Oxygen content (%)		Carbonmonoxide (ppm)		
	RM Stack Gas Conc	Corrected Gas Conc	RM Stack Gas Conc	Corrected Gas Conc @Actual O2	Corrected Gas Conc @7% O2
1	6.51	6.44	1.01	0.97	0.93
2	6.42	6.36	0.46	0.42	0.40
3	6.32	6.28	0.37	0.32	0.30
Average	6.42	6.36	0.61	0.57	0.54

STAR PETROLEUM REFINING PUBLIC CO., LTD.

EMISSION TEST RESULT

Date: November 13, 2024 Start time: 3:50 PM O₂ instrument Model: AMI 70 NO_x instrument Model: TELEDYNE 200 EM SO₂ instrument Model: API 100 AH CO instrument Model: THERMO 48 C Fuel Type : Natural Gas	Run # : 1 Location : DHTU Finish time : 4:10 PM Serial No.: 121121-10 Serial No.: 433 Serial No.: 118 Serial No.: 0412106049 Test Operator : Song H.
---	---

Time, min	O ₂ (%)	NO _x (ppm)	SO ₂ (ppm)	CO (ppm)
3:50 PM	6.43	41.45	1.37	0.54
3:51 PM	6.37	41.72	1.43	0.37
3:52 PM	6.52	41.67	1.55	0.52
3:53 PM	6.44	41.59	1.48	0.48
3:54 PM	6.38	41.46	1.36	0.26
3:55 PM	6.54	41.42	1.34	0.58
3:56 PM	6.43	41.38	1.46	0.35
3:57 PM	6.56	41.65	1.28	0.39
3:58 PM	6.53	41.22	1.29	0.82
3:59 PM	6.57	41.25	1.36	1.34
4:00 PM	6.58	41.24	1.24	1.47
4:01 PM	6.54	41.20	1.32	1.72
4:02 PM	6.54	41.17	1.32	1.70
4:03 PM	6.51	41.25	1.31	1.83
4:04 PM	6.50	41.39	1.30	1.83
4:05 PM	6.60	41.84	1.32	1.51
4:06 PM	6.54	42.70	1.37	1.33
4:07 PM	6.53	41.15	1.31	1.14
4:08 PM	6.56	41.33	1.33	1.06
4:09 PM	6.50	41.48	1.34	0.96
4:10 PM	6.50	41.50	1.34	0.91
Average	6.51	41.48	1.35	1.01


 Signature _____
Miss Katesarin Vorradetwittaya
Environmental Scientist

STAR PETROLEUM REFINING PUBLIC CO., LTD.

EMISSION TEST RESULT

Date: <u>November 13, 2024</u> Start time: <u>4:11 PM</u> O₂ instrument Model: <u>AMI 70</u> NO_x instrument Model: <u>TELEDYNE 200 EM</u> SO₂ instrument Model: <u>API 100 AH</u> CO instrument Model: <u>THERMO 48 C</u> Fuel Type : <u>Natural Gas</u>	Run # : <u>2</u> Location : <u>DHTU</u> Finish time : <u>4:31 PM</u> Serial No.: <u>121121-10</u> Serial No.: <u>433</u> Serial No.: <u>118</u> Serial No.: <u>0412106049</u> Test Operator : <u>Song H.</u>
--	---

Time, min	O ₂ (%)	NO _x (ppm)	SO ₂ (ppm)	CO (ppm)
4:11 PM	6.55	41.60	1.30	0.86
4:12 PM	6.54	41.69	1.32	0.70
4:13 PM	6.46	41.67	1.32	0.65
4:14 PM	6.47	41.74	1.35	0.55
4:15 PM	6.54	41.81	1.37	0.48
4:16 PM	6.52	41.86	1.41	0.50
4:17 PM	6.53	41.97	1.43	0.45
4:18 PM	6.40	42.02	1.44	0.43
4:19 PM	6.32	41.91	1.39	0.46
4:20 PM	6.37	41.78	1.43	0.41
4:21 PM	6.38	41.86	1.45	0.51
4:22 PM	6.29	41.84	1.43	0.39
4:23 PM	6.38	41.83	1.48	0.41
4:24 PM	6.44	42.10	1.49	0.47
4:25 PM	6.50	42.26	1.51	0.47
4:26 PM	6.55	42.36	1.54	0.36
4:27 PM	6.48	42.44	1.55	0.34
4:28 PM	6.26	42.34	1.54	0.40
4:29 PM	6.22	42.16	1.57	0.34
4:30 PM	6.29	42.20	1.57	0.27
4:31 PM	6.31	42.40	1.67	0.22
Average	6.42	41.99	1.46	0.46


 Signature _____
Miss Katesarin Vorradetwittaya
Environmental Scientist


STAR PETROLEUM REFINING PUBLIC CO., LTD.

EMISSION TEST RESULT

Date: November 13, 2024 Start time: 4:32 PM O₂ instrument Model: AMI 70 NO_x instrument Model: TELEDYNE 200 EM SO₂ instrument Model: API 100 AH CO instrument Model: THERMO 48 C Fuel Type : Natural Gas	Run # : 3 Location : DHTU Finish time : 4:52 PM Serial No.: 121121-10 Serial No.: 433 Serial No.: 118 Serial No.: 0412106049 Test Operator : Song H.
---	---

Time, min	O ₂ (%)	NO _x (ppm)	SO ₂ (ppm)	CO (ppm)
4:32 PM	6.29	42.35	1.67	0.33
4:33 PM	6.37	42.30	1.67	0.45
4:34 PM	6.35	42.46	1.67	0.23
4:35 PM	6.33	42.52	1.69	0.31
4:36 PM	6.26	42.45	1.73	0.28
4:37 PM	6.13	42.30	1.75	0.35
4:38 PM	6.17	42.12	1.73	0.34
4:39 PM	6.28	41.99	1.74	0.32
4:40 PM	6.41	42.13	1.83	0.46
4:41 PM	6.43	42.28	1.80	0.25
4:42 PM	6.33	42.08	1.85	0.42
4:43 PM	6.35	41.80	1.86	0.48
4:44 PM	6.42	41.66	1.85	0.43
4:45 PM	6.35	41.59	1.92	0.37
4:46 PM	6.33	41.57	1.94	0.39
4:47 PM	6.33	41.59	1.91	0.29
4:48 PM	6.39	41.66	1.94	0.31
4:49 PM	6.38	41.73	2.00	0.45
4:50 PM	6.40	41.78	2.05	0.45
4:51 PM	6.33	41.87	2.16	0.42
4:52 PM	6.19	41.82	2.22	0.44
Average	6.32	42.00	1.86	0.37

Signature



Miss Katesarin Vorradetwittaya

Environmental Scientist



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TEL : +66(0) 2959-3600 FAX : +66(0) 2959-3535 E-mail : envserv@secot.co.th

STACK EMISSION ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REFERENCE NO.	: Refinery-224003-COA-Stk/PM
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING DATE	: 06/11/2024
RECEIVED DATE	: 08/11/2024	ANALYTICAL DATE	: 11-12/11/2024
REPORT DATE	: 25/11/2024	SAMPLE CONDITION	: Normal
STACK LOCATION	: HVGO-HTU Stack	OPERATOR	: Mr. Song Hengchwankun
SOURCE DESCRIPTION	: Combustion	FUEL TYPE	: Natural Gas + Refinery Fuel Gas

STACK DESCRIPTION

Height	: 36.2	m	Gas Velocity	: 5.1	m/s
Diameter	: 1.6	m	Flow rate ⁽¹⁾	: 241.4	Ncu.m/min
Temperature	: 394.3	°C	Excess Oxygen	: 6.6	%

PARAMETER	UNIT	RESULTS ⁽¹⁾		ASSIGNED VALUE ⁽²⁾	STANDARD ⁽³⁾	REFERENCE METHODS
		6.6 % O ₂	7 % O ₂			
Particulate Matter	mg/Ncu.m	3.8	3.7	60	60	US. EPA Method 5

(Miss Pornnapa Budthum)

Analyst

REG.NO.จ-239-จ-0018

(Miss Narisa Poowasanpetch)

Technical Management Team

REG.NO.จ-239-ท-0010

Remark : 1. Reported analysis refers to submitted sample only.

2. This report shall not be reproduced, except in full, without official approval.

3. ⁽¹⁾ At standard pressure of 760 mmHg and temperature of 25 °C, dry basis.

4. ⁽²⁾ Assigned value in EIA Report Expansion 3 of Refinery Plant, B.E. 2561 (2018).

5. ⁽³⁾ Notification of the Ministry of Natural Resources and Environment B.E.2554 (2011).



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TEL : +66(0) 2959-3600 FAX : +66(0) 2959-3535 E-mail : envserv@secot.co.th

STACK EMISSION ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REFERENCE NO.	: Refinery-224003-COA-Stk/CEMs
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING DATE	: 06/11/2024
RECEIVED DATE	: 15/11/2024	ANALYTICAL DATE	: 18/11/2024-10/12/2024
REPORT DATE	: 10/12/2024	SAMPLE CONDITION	: Normal
STACK LOCATION	: HVGO-HTU Stack	OPERATOR	: Mr. Song Hengchwankun
SOURCE DESCRIPTION	: Combustion	FUEL TYPE	: Natural Gas + Refinery Fuel Gas

STACK DESCRIPTION

Height	: 36.2	m	Gas Velocity	: 5.1	m/s
Diameter	: 1.6	m	Flow rate ⁽¹⁾	: 241.4	Ncu.m/min
Temperature	: 394.3	°C	Excess Oxygen	: 6.6	%

PARAMETER	CONCENTRATIONS				EMISSION RATE		REFERENCE METHOD
	RESULTS ⁽¹⁾		ASSIGNED VALUE ⁽²⁾	STANDARD ⁽³⁾	RESULT	ASSIGNED VALUE ⁽²⁾	
	6.6 % O ₂	7 % O ₂	7 % O ₂	7 % O ₂			
	ppm	ppm	ppm	ppm	g/s	g/s	
Sulfur Dioxide (SO ₂)	1.2	1.2	60	60	0.013	0.630	US.EPA Method 6C
Oxide of Nitrogen (NO _x)	54.7	53.2	120	200	0.414	0.920	US.EPA Method 7E
Carbon Monoxide (CO)	0.3	0.3	100	690	0.001	0.100	US.EPA Method 10

(Miss Katesarin Vorradetwittaya)

Environmental Scientist

(Miss Preeda Somjai)

Technical Management Team

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4. ⁽²⁾ Assigned value in EIA Report Expasion 3 of Refinery Plant, B.E. 2561 (2018).

5. ⁽³⁾ Notification of the Ministry of Natural Resources and Environment B.E.2554 (2011).

The Monitoring Result of Emission Concentration
HVGO
STAR PETROLEUM REFINING PUBLIC CO., LTD.
November 6, 2024

Run Number	Oxygen content (%)		Oxide of Nitrogen (ppm)		
	RM Stack Gas Conc	Corrected Gas Conc	RM Stack Gas Conc	Corrected Gas Conc @Actual O2	Corrected Gas Conc @7% O2
1	6.10	5.99	53.60	53.58	49.95
2	6.86	6.75	55.19	55.17	54.20
3	7.22	7.11	55.29	55.27	55.71
Average	6.73	6.62	54.69	54.67	53.21

Run Number	Oxygen content (%)		Sulfur dioxide (ppm)		
	RM Stack Gas Conc	Corrected Gas Conc	RM Stack Gas Conc	Corrected Gas Conc @Actual O2	Corrected Gas Conc @7% O2
1	6.10	5.99	1.30	1.24	1.16
2	6.86	6.75	1.29	1.23	1.21
3	7.22	7.11	1.28	1.23	1.24
Average	6.73	6.62	1.29	1.23	1.20

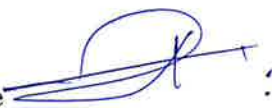
Run Number	Oxygen content (%)		Carbonmonoxide (ppm)		
	RM Stack Gas Conc	Corrected Gas Conc	RM Stack Gas Conc	Corrected Gas Conc @Actual O2	Corrected Gas Conc @7% O2
1	6.10	5.99	0.35	0.28	0.26
2	6.86	6.75	0.34	0.28	0.28
3	7.22	7.11	0.32	0.26	0.26
Average	6.73	6.62	0.34	0.27	0.27

STAR PETROLEUM REFINING PUBLIC CO., LTD.

EMISSION TEST RESULT

Date: November 6, 2024 Start time: 2:10 PM O₂ instrument Model: AMI 70 NO_x instrument Model: Teledyne 200 EM SO₂ instrument Model: API 100 AH CO instrument Model: THERMO 48 C Fuel Type : Natural Gas	Run # : 1 Location : HVGO Finish time : 2:30 PM Serial No.: 121121-9 Serial No.: 433 Serial No.: 118 Serial No.: 0412106049 Test Operator : Kittipong T.
--	---

Time, min	O ₂ (%)	NO _x (ppm)	SO ₂ (ppm)	CO (ppm)
2:10 PM	5.97	50.35	1.30	0.03
2:11 PM	5.95	50.52	1.30	0.36
2:12 PM	5.88	51.22	1.30	0.36
2:13 PM	5.96	52.17	1.30	0.36
2:14 PM	5.98	52.77	1.30	0.35
2:15 PM	6.01	53.14	1.30	0.35
2:16 PM	6.00	53.40	1.30	0.36
2:17 PM	6.00	53.60	1.30	0.37
2:18 PM	5.97	53.71	1.31	0.38
2:19 PM	6.06	53.85	1.31	0.37
2:20 PM	5.98	53.96	1.31	0.38
2:21 PM	6.01	54.04	1.31	0.38
2:22 PM	5.95	54.16	1.31	0.38
2:23 PM	6.06	54.41	1.31	0.38
2:24 PM	6.21	54.64	1.31	0.38
2:25 PM	6.24	54.68	1.31	0.37
2:26 PM	6.29	54.88	1.30	0.37
2:27 PM	6.31	55.10	1.30	0.37
2:28 PM	6.40	55.12	1.30	0.36
2:29 PM	6.45	55.02	1.30	0.37
2:30 PM	6.42	54.94	1.30	0.37
Average	6.10	53.60	1.30	0.35

Signature 

Miss Katesarin Vorradetwittaya
Environmental Scientist

STAR PETROLEUM REFINING PUBLIC CO., LTD.

EMISSION TEST RESULT

Date: November 6, 2024 Start time: 2:31 PM O₂ instrument Model: AMI 70 NO_x instrument Model: Teledyne 200 EM SO₂ instrument Model: API 100 AH CO instrument Model: THERMO 48 C Fuel Type : Natural Gas	Run # : 2 Location : HVGO Finish time : 2:51 PM Serial No.: 121121-9 Serial No.: 433 Serial No.: 118 Serial No.: 0412106049 Test Operator : Kittipong T.
--	---

Time, min	O ₂ (%)	NO _x (ppm)	SO ₂ (ppm)	CO (ppm)
2:31 PM	6.48	54.85	1.30	0.37
2:32 PM	6.47	54.95	1.30	0.36
2:33 PM	6.50	54.93	1.30	0.36
2:34 PM	6.54	54.76	1.30	0.36
2:35 PM	6.55	54.70	1.30	0.35
2:36 PM	6.65	54.71	1.30	0.35
2:37 PM	6.69	54.92	1.30	0.35
2:38 PM	6.75	55.25	1.30	0.35
2:39 PM	6.84	55.45	1.30	0.35
2:40 PM	6.88	55.50	1.29	0.34
2:41 PM	7.01	55.45	1.29	0.34
2:42 PM	7.03	55.38	1.29	0.34
2:43 PM	6.95	55.42	1.29	0.34
2:44 PM	6.94	55.45	1.29	0.34
2:45 PM	7.02	55.34	1.29	0.34
2:46 PM	7.02	55.25	1.29	0.33
2:47 PM	7.12	55.24	1.29	0.33
2:48 PM	7.12	55.21	1.29	0.33
2:49 PM	7.10	55.41	1.29	0.33
2:50 PM	7.20	55.48	1.29	0.33
2:51 PM	7.25	55.34	1.29	0.33
Average	6.86	55.19	1.29	0.34


 Signature _____
Miss Katesarin Vorradetwittaya
Environmental Scientist

STAR PETROLEUM REFINING PUBLIC CO., LTD.

EMISSION TEST RESULT

Date: November 6, 2024 Start time: 2:52 PM O₂ instrument Model: AMI 70 NO_x instrument Model: Teledyne 200 EM SO₂ instrument Model: API 100 AH CO instrument Model: THERMO 48 C Fuel Type : Natural Gas	Run # : 3 Location : HVGO Finish time : 3:12 PM Serial No.: 121121-9 Serial No.: 433 Serial No.: 118 Serial No.: 0412106049 Test Operator : Kittipong T.
--	---

Time, min	O ₂ (%)	NO _x (ppm)	SO ₂ (ppm)	CO (ppm)
2:52 PM	7.28	55.34	1.29	0.32
2:53 PM	7.26	55.37	1.29	0.32
2:54 PM	7.26	55.44	1.29	0.32
2:55 PM	7.19	55.63	1.28	0.32
2:56 PM	7.21	55.65	1.28	0.32
2:57 PM	7.24	55.52	1.28	0.32
2:58 PM	7.27	55.49	1.28	0.32
2:59 PM	7.33	55.57	1.28	0.32
3:00 PM	7.32	55.59	1.28	0.32
3:01 PM	7.30	55.46	1.28	0.32
3:02 PM	7.27	55.44	1.28	0.31
3:03 PM	7.27	55.37	1.28	0.32
3:04 PM	7.28	55.28	1.28	0.31
3:05 PM	7.25	55.34	1.28	0.31
3:06 PM	7.15	55.54	1.28	0.31
3:07 PM	7.18	55.59	1.28	0.32
3:08 PM	7.13	55.43	1.29	0.33
3:09 PM	7.08	55.37	1.29	0.34
3:10 PM	7.02	55.55	1.29	0.35
3:11 PM	7.11	53.38	1.29	0.35
3:12 PM	7.12	53.65	1.29	0.36
Average	7.22	55.29	1.28	0.32

Signature 
 Miss Katesarin Vorradetwittaya
 Environmental Scientist



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TEL : +66(0) 2959-3600 FAX : +66(0) 2959-3535 E-mail : envserv@secot.co.th

STACK EMISSION ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REFERENCE NO.	: Refinery-224003-COA-Stk/PM
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING DATE	: 06/11/2024
RECEIVED DATE	: 08/11/2024	ANALYTICAL DATE	: 11-12/11/2024
REPORT DATE	: 25/11/2024	SAMPLE CONDITION	: Normal
STACK LOCATION	: WCN-HTU Stack	OPERATOR	: Mr. Song Hengchwankun
SOURCE DESCRIPTION	: Combustion	FUEL TYPE	: Natural Gas + Refinery Fuel Gas

STACK DESCRIPTION

Height	: 32.5	m	Gas Velocity	: 6.1	m/s
Diameter	: 0.86	m	Flow rate ⁽¹⁾	: 96.1	Ncu.m/min
Temperature	: 288.3	°C	Excess Oxygen	: 6.9	%

PARAMETER	UNIT	RESULTS ⁽¹⁾		ASSIGNED VALUE ⁽²⁾	STANDARD ⁽³⁾	REFERENCE METHODS
		6.9 % O ₂	7 % O ₂			
Particulate Matter	mg/Ncu.m	2.2	2.2	35	60	US. EPA Method 5


(Miss Pornnapa Budthum)

Analyst

REG.NO.จ-239-จ-0018


(Miss Narisa Poowasanpetch)

(Miss Narisa Poowasanpetch)

Technical Management Team

REG.NO.จ-239-ค-0010

Remark : 1. Reported analysis refers to submitted sample only.

2. This report shall not be reproduced, except in full, without official approval.

3. ⁽¹⁾ At standard pressure of 760 mmHg and temperature of 25 °C, dry basis.

4. ⁽²⁾ Assigned value in EIA Report Expansion 3 of Refinery Plant, B.E. 2561 (2018).

5. ⁽³⁾ Notification of the Ministry of Natural Resources and Environment B.E.2554 (2011).



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TEL : +66(0) 2959-3600 FAX : +66(0) 2959-3535 E-mail : envserv@secot.co.th

STACK EMISSION ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REFERENCE NO.	: Refinery-224003-COA-Stk/CEMs
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING DATE	: 06/11/2024
RECEIVED DATE	: 15/11/2024	ANALYTICAL DATE	: 18/11/2024-10/12/2024
REPORT DATE	: 10/12/2024	SAMPLE CONDITION	: Normal
STACK LOCATION	: WCN-HTU Stack	OPERATOR	: Mr. Song Hengchwankun
SOURCE DESCRIPTION	: Combustion	FUEL TYPE	: Natural Gas + Refinery Fuel Gas

STACK DESCRIPTION

Height	: 32.5	m	Gas Velocity	: 6.1	m/s
Diameter	: 0.9	m	Flow rate ⁽¹⁾	: 96.1	Ncu.m/min
Temperature	: 288.3	°C	Excess Oxygen	: 6.9	%

PARAMETER	CONCENTRATIONS				EMISSION RATE		REFERENCE METHOD
	RESULTS ⁽¹⁾		ASSIGNED	STANDARD ⁽³⁾	RESULT	ASSIGNED	
			VALUE ⁽²⁾			VALUE ⁽²⁾	
	6.9 % O ₂	7 % O ₂	7 % O ₂	7 % O ₂			
	ppm	ppm	ppm	ppm	g/s	g/s	
Sulfur Dioxide (SO ₂)	1.7	1.7	20	60	0.007	0.100	US.EPA Method 6C
Oxide of Nitrogen (NO _x)	22.5	22.3	30	200	0.068	0.125	US.EPA Method 7E
Carbon Monoxide (CO)	0.3	0.3	690	690	0.001	2.300	US.EPA Method 10

(Miss Katesarin Vorradetwittaya)

Environmental Scientist

(Miss Preeda Somjai)

Technical Management Team

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5. ⁽³⁾ Notification of the Ministry of Natural Resources and Environment B.E.2554 (2011).

The Monitoring Result of Emission Concentration
WCN-HTU
STAR PETROLEUM REFINING PUBLIC CO., LTD.
November 6, 2024

Run Number	Oxygen content (%)		Oxide of Nitrogen (ppm)		
	RM Stack Gas Conc	Corrected Gas Conc	RM Stack Gas Conc	Corrected Gas Conc @Actual O2	Corrected Gas Conc @7% O2
1	6.94	6.85	22.15	22.14	21.90
2	6.94	6.87	22.78	22.76	22.55
3	7.05	6.99	22.50	22.47	22.45
Average	6.98	6.90	22.48	22.46	22.30

Run Number	Oxygen content (%)		Sulfur dioxide (ppm)		
	RM Stack Gas Conc	Corrected Gas Conc	RM Stack Gas Conc	Corrected Gas Conc @Actual O2	Corrected Gas Conc @7% O2
1	6.94	6.85	1.72	1.69	1.67
2	6.94	6.87	1.78	1.75	1.73
3	7.05	6.99	1.78	1.75	1.75
Average	6.98	6.90	1.76	1.73	1.72

Run Number	Oxygen content (%)		Carbonmonoxide (ppm)		
	RM Stack Gas Conc	Corrected Gas Conc	RM Stack Gas Conc	Corrected Gas Conc @Actual O2	Corrected Gas Conc @7% O2
1	6.94	6.85	0.28	0.25	0.25
2	6.94	6.87	0.33	0.30	0.30
3	7.05	6.99	0.33	0.29	0.29
Average	6.98	6.90	0.31	0.28	0.28

STAR PETROLEUM REFINING PUBLIC CO., LTD.

EMISSION TEST RESULT

Date: <u>November 6, 2024</u> Start time: <u>2:10 PM</u> O₂ instrument Model: <u>AMI 70</u> NO_x instrument Model: <u>API 200 AH</u> SO₂ instrument Model: <u>API 100 AH</u> CO instrument Model: <u>THERMO 48 C</u> Fuel Type : <u>Natural Gas</u>	Run # : <u>1</u> Location : <u>WCN-HTU</u> Finish time : <u>2:30 PM</u> Serial No.: <u>161212-13</u> Serial No.: <u>314</u> Serial No.: <u>058</u> Serial No.: <u>78253-388</u> Test Operator : <u>Song H.</u>
--	---

Time, min	O ₂ (%)	NO _x (ppm)	SO ₂ (ppm)	CO (ppm)
2:10 PM	7.12	21.97	1.75	0.22
2:11 PM	7.15	21.97	1.58	0.22
2:12 PM	7.12	21.91	1.86	0.22
2:13 PM	6.98	21.82	1.83	0.22
2:14 PM	6.97	21.69	1.74	0.22
2:15 PM	7.07	21.53	1.64	0.22
2:16 PM	7.07	21.64	1.78	0.22
2:17 PM	7.09	21.62	1.65	0.22
2:18 PM	7.01	21.71	1.68	0.28
2:19 PM	6.98	21.69	1.71	0.32
2:20 PM	6.97	22.00	1.73	0.32
2:21 PM	6.90	22.40	1.72	0.32
2:22 PM	6.80	22.56	1.73	0.33
2:23 PM	6.86	22.52	1.77	0.33
2:24 PM	6.71	22.49	1.71	0.33
2:25 PM	6.74	22.36	1.68	0.33
2:26 PM	6.80	22.54	1.79	0.33
2:27 PM	6.83	22.78	1.69	0.33
2:28 PM	6.82	22.70	1.77	0.33
2:29 PM	6.78	22.65	1.67	0.33
2:30 PM	6.93	22.62	1.64	0.33
Average	6.94	22.15	1.72	0.28


 Signature _____
Miss Katesarin Vorradetwittaya
Environmental Scientist

STAR PETROLEUM REFINING PUBLIC CO., LTD.

EMISSION TEST RESULT

Date: <u>November 6, 2024</u> Start time: <u>2:31 PM</u> O₂ instrument Model: <u>AMI 70</u> NO_x instrument Model: <u>API 200 AH</u> SO₂ instrument Model: <u>API 100 AH</u> CO instrument Model: <u>THERMO 48 C</u> Fuel Type : <u>Natural Gas</u>	Run # : <u>2</u> Location : <u>WCN-HTU</u> Finish time : <u>2:51 PM</u> Serial No.: <u>161212-13</u> Serial No.: <u>314</u> Serial No.: <u>058</u> Serial No.: <u>78253-388</u> Test Operator : <u>Song H.</u>
--	---

Time, min	O ₂ (%)	NO _x (ppm)	SO ₂ (ppm)	CO (ppm)
2:31 PM	6.90	22.65	1.63	0.33
2:32 PM	6.97	22.55	1.61	0.33
2:33 PM	6.86	22.64	1.63	0.33
2:34 PM	6.87	22.74	1.83	0.33
2:35 PM	6.82	22.83	1.71	0.33
2:36 PM	6.81	22.89	1.81	0.33
2:37 PM	6.85	22.80	1.63	0.33
2:38 PM	6.79	22.79	1.73	0.33
2:39 PM	6.82	22.68	1.82	0.33
2:40 PM	6.95	22.76	1.87	0.33
2:41 PM	7.03	22.85	1.96	0.33
2:42 PM	7.01	22.77	1.91	0.33
2:43 PM	7.14	22.91	1.88	0.33
2:44 PM	7.16	22.65	1.85	0.33
2:45 PM	7.00	22.82	1.86	0.33
2:46 PM	7.02	22.84	1.86	0.33
2:47 PM	6.95	22.95	1.81	0.33
2:48 PM	6.92	23.05	1.80	0.33
2:49 PM	6.98	22.89	1.79	0.33
2:50 PM	6.94	22.72	1.76	0.31
2:51 PM	6.89	22.69	1.72	0.33
Average	6.94	22.78	1.78	0.33


 Signature _____
Miss Katesarin Vorradetwittaya
Environmental Scientist

STAR PETROLEUM REFINING PUBLIC CO., LTD.

EMISSION TEST RESULT

Date: <u>November 6, 2024</u> Start time: <u>2:52 PM</u> O₂ instrument Model: <u>AMI 70</u> NO_x instrument Model: <u>API 200 AH</u> SO₂ instrument Model: <u>API 100 AH</u> CO instrument Model: <u>THERMO 48 C</u> Fuel Type : <u>Natural Gas</u>	Run # : <u>3</u> Location : <u>WCN-HTU</u> Finish time : <u>3:12 PM</u> Serial No.: <u>161212-13</u> Serial No.: <u>314</u> Serial No.: <u>058</u> Serial No.: <u>78253-388</u> Test Operator : <u>Song H.</u>
--	---

Time, min	O ₂ (%)	NO _x (ppm)	SO ₂ (ppm)	CO (ppm)
2:52 PM	7.08	22.78	1.68	0.33
2:53 PM	7.14	23.07	1.64	0.33
2:54 PM	7.11	23.10	1.67	0.33
2:55 PM	7.10	23.14	1.65	0.33
2:56 PM	6.95	23.19	1.68	0.33
2:57 PM	7.07	23.06	1.62	0.33
2:58 PM	6.99	22.89	1.62	0.33
2:59 PM	7.03	22.87	1.60	0.33
3:00 PM	7.10	22.83	1.58	0.33
3:01 PM	7.08	22.89	1.60	0.33
3:02 PM	6.98	22.80	1.58	0.33
3:03 PM	7.09	22.85	1.91	0.33
3:04 PM	6.99	22.93	1.96	0.33
3:05 PM	6.98	23.15	1.95	0.33
3:06 PM	7.01	22.89	1.96	0.33
3:07 PM	7.09	21.03	1.96	0.33
3:08 PM	7.22	20.97	1.96	0.33
3:09 PM	7.07	21.23	1.98	0.33
3:10 PM	7.11	21.51	1.97	0.33
3:11 PM	6.98	21.64	1.89	0.33
3:12 PM	6.93	21.71	1.86	0.33
Average	7.05	22.50	1.78	0.33

Signature 
Miss Katesarin Vorradetwittaya
Environmental Scientist



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TEL : +66(0) 2959-3600 FAX : +66(0) 2959-3535 E-mail : envserv@secot.co.th

STACK EMISSION ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REFERENCE NO.	: Refinery-224003-COA-Stk/PM
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING DATE	: 06/11/2024
RECEIVED DATE	: 08/11/2024	ANALYTICAL DATE	: 11-12/11/2024
REPORT DATE	: 25/11/2024	SAMPLE CONDITION	: Normal
STACK LOCATION	: SRU/TGTU Stack	OPERATOR	: Mr. Song Hengchwankun
SOURCE DESCRIPTION	: Combustion	FUEL TYPE	: Natural Gas + Refinery Fuel Gas

STACK DESCRIPTION

Height	: 70.1	m	Gas Velocity	: 4.3	m/s
Diameter	: 2.2	m	Flow rate ⁽¹⁾	: 325.1	Ncu.m/min
Temperature	: 514.4	°C	Excess Oxygen	: 6.4	%

PARAMETER	UNIT	RESULTS ⁽¹⁾		ASSIGNED VALUE ⁽²⁾	STANDARD ⁽³⁾	REFERENCE METHODS
		6.4 % O ₂	7 % O ₂			
Particulate Matter	mg/Ncu.m	3.3	3.2	60	-	US. EPA Method 5


(Miss Pornnapa Budthum)

Analyst

REG.NO.จ-239-ก-0018


(Miss Narisa Poowasanpetch)

Technical Management Team

REG.NO.จ-239-ก-0010

Remark : 1. Reported analysis refers to submitted sample only.

2. This report shall not be reproduced, except in full, without official approval.

3. ⁽¹⁾ At standard pressure of 760 mmHg and temperature of 25 °C, dry basis.

4. ⁽²⁾ Assigned value in EIA Report Expansion 3 of Refinery Plant, B.E. 2561 (2018).

5. ⁽³⁾ Notification of the Ministry of Natural Resources and Environment B.E.2554 (2011).



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TEL : +66(0) 2959-3600 FAX : +66(0) 2959-3535 E-mail : envserv@secot.co.th

STACK EMISSION ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REFERENCE NO.	: Refinery-224003-COA-Stk/H2S
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING DATE	: 06/11/2024
RECEIVED DATE	: 08/11/2024	ANALYTICAL DATE	: 18/11/2024
REPORT DATE	: 26/11/2024	SAMPLE CONDITION	: Normal
STACK LOCATION	: SRU-TGTU Stack	OPERATOR	: Mr. Song Hengchwankun
SOURCE DESCRIPTION	: Combustion	FUEL TYPE	: Natural Gas + Refinery Fuel Gas

STACK DESCRIPTION

Height	: 70.1	m	Gas Velocity	: 4.3	m/s
Diameter	: 2.2	m	Flow rate ⁽¹⁾	: 325.1	Ncu.m/min
Temperature	: 514.4	°C	Excess Oxygen	: 6.4	%

PARAMETER	UNIT	RESULTS ⁽¹⁾		ASSIGNED VALUE ⁽²⁾	STANDARD	REFERENCE METHODS
		6.4 % O ₂	7 % O ₂			
Hydrogen Sulfide	ppm	<0.30	<0.30	60	-	US. EPA Method 16

Sudaporn S.

(Miss Sudaporn Soonthorn)

Analyst

Narisa Poowasanpetch

(Miss Narisa Poowasanpetch)

Technical Management Team

Remark : 1. Reported analysis refers to submitted sample only.

2. This report shall not be reproduced, except in full, without official approval.

3. ⁽¹⁾ At standard pressure of 760 mmHg and temperature of 25 °C, dry basis.

4. ⁽²⁾ Assigned value in EIA Report Expansion 3 of Refinery Plant, B.E. 2561 (2018).



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TEL : +66(0) 2959-3600 FAX : +66(0) 2959-3535 E-mail : envserv@secot.co.th

STACK EMISSION ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REFERENCE NO.	: Refinery-224003-COA-Stk/CEMs
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING DATE	: 06/11/2024
RECEIVED DATE	: 15/11/2024	ANALYTICAL DATE	: 18/11/2024-10/12/2024
REPORT DATE	: 10/12/2024	SAMPLE CONDITION	: Normal
STACK LOCATION	: SRU/TGTU Stack	OPERATOR	: Mr. Song Hengchwankun
SOURCE DESCRIPTION	: Combustion	FUEL TYPE	: Natural Gas + Refinery Fuel Gas

STACK DESCRIPTION

Height	: 70.1	m	Gas Velocity	: 4.3	m/s
Diameter	: 2.2	m	Flow rate ⁽¹⁾	: 325.1	Ncu.m/min
Temperature	: 514.4	°C	Excess Oxygen	: 6.4	%

PARAMETER	CONCENTRATIONS				EMISSION RATE		REFERENCE METHOD
	RESULTS ⁽¹⁾		ASSIGNED VALUE ⁽²⁾	STANDARD ⁽³⁾	RESULT	ASSIGNED VALUE ⁽²⁾	
	6.4 % O ₂	7 % O ₂	7 % O ₂	7 % O ₂			
	ppm	ppm	ppm	ppm	g/s	g/s	
Sulfur Dioxide (SO ₂)	285.6	273.5	500	500	4.051	10.000	US.EPA Method 6C
Oxide of Nitrogen (NO _x)	0.03	0.03	60	200	0.0003	0.320	US.EPA Method 7E
Carbon Monoxide (CO)	239.5	229.4	350	690	1.486	2.000	US.EPA Method 10

(Miss Katesarin Vorradetwittaya)

Environmental Scientist

(Miss Preeda Somjai)

Technical Management Team

Remark : 1. Reported analysis refers to submitted sample only.

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3. ⁽¹⁾ At standard pressure of 760 mmHg and temperature of 25 °C, dry basis.

4. ⁽²⁾ Assigned value in EIA Report Expasion 3 of Refinery Plant, B.E. 2561 (2018).

5. ⁽³⁾ Notification of the Ministry of Natural Resources and Environment B.E.2554 (2011).

The Monitoring Result of Emission Concentration
SRU
STAR PETROLEUM REFINING PUBLIC CO., LTD.
November 6, 2024

Run Number	Oxygen content (%)		Oxide of Nitrogen (ppm)		
	RM Stack Gas Conc	Corrected Gas Conc	RM Stack Gas Conc	Corrected Gas Conc @Actual O2	Corrected Gas Conc @7% O2
1	6.48	6.39	0.06	0.03	0.03
2	6.48	6.38	0.07	0.04	0.04
3	6.50	6.39	0.04	0.02	0.02
Average	6.48	6.39	0.06	0.03	0.03

Run Number	Oxygen content (%)		Sulfur dioxide (ppm)		
	RM Stack Gas Conc	Corrected Gas Conc	RM Stack Gas Conc	Corrected Gas Conc @Actual O2	Corrected Gas Conc @7% O2
1	6.48	6.39	277.01	277.11	265.46
2	6.48	6.38	286.88	287.01	274.75
3	6.50	6.39	292.43	292.59	280.29
Average	6.48	6.39	285.44	285.57	273.50

Run Number	Oxygen content (%)		Carbonmonoxide (ppm)		
	RM Stack Gas Conc	Corrected Gas Conc	RM Stack Gas Conc	Corrected Gas Conc @Actual O2	Corrected Gas Conc @7% O2
1	6.48	6.39	255.22	255.35	244.62
2	6.48	6.38	233.05	233.17	223.21
3	6.50	6.39	229.78	229.90	220.24
Average	6.48	6.39	239.35	239.47	229.35

STAR PETROLEUM REFINING PUBLIC CO., LTD.

EMISSION TEST RESULT

Date: November 6, 2024 Start time: 10:50 AM O₂ instrument Model: AMI 70 NO_x instrument Model: Teledyne 200 EM SO₂ instrument Model: API 100 AH CO instrument Model: THERMO 48 C Fuel Type : Natural Gas	Run # : 1 Location : SRU Finish time : 11:10 AM Serial No.: 121121-9 Serial No.: 433 Serial No.: 118 Serial No.: 0412106049 Test Operator : Kittipong T.
---	---

Time, min	O ₂ (%)	NO _x (ppm)	SO ₂ (ppm)	CO (ppm)
10:50 AM	6.57	0.13	257.30	260.42
10:51 AM	6.57	0.06	261.44	277.42
10:52 AM	6.47	0.03	265.71	275.59
10:53 AM	6.52	0.07	271.38	269.25
10:54 AM	6.48	0.12	273.56	280.24
10:55 AM	6.44	0.03	274.40	256.57
10:56 AM	6.49	0.03	275.66	259.55
10:57 AM	6.54	0.11	276.73	269.39
10:58 AM	6.57	0.03	278.42	273.88
10:59 AM	6.54	0.11	279.93	274.70
11:00 AM	6.38	0.11	280.44	266.37
11:01 AM	6.39	0.02	279.33	238.85
11:02 AM	6.43	0.00	280.23	238.02
11:03 AM	6.44	0.05	281.83	244.67
11:04 AM	6.45	0.02	281.56	244.16
11:05 AM	6.42	0.00	282.41	241.66
11:06 AM	6.46	0.09	282.72	237.15
11:07 AM	6.48	0.06	282.15	241.98
11:08 AM	6.49	0.04	282.36	241.64
11:09 AM	6.43	0.04	284.63	235.63
11:10 AM	6.46	0.02	285.02	232.48
Average	6.48	0.06	277.01	255.22

Signature



Miss Katesarin Vorradetwittaya

Environmental Scientist

STAR PETROLEUM REFINING PUBLIC CO., LTD.

EMISSION TEST RESULT

Date: <u>November 6, 2024</u> Start time: <u>11:11 AM</u> O₂ instrument Model: <u>AMI 70</u> NO_x instrument Model: <u>Teledyne 200 EM</u> SO₂ instrument Model: <u>API 100 AH</u> CO instrument Model: <u>THERMO 48 C</u> Fuel Type : <u>Natural Gas</u>	Run # : <u>2</u> Location : <u>SRU</u> Finish time : <u>11:31 AM</u> Serial No.: <u>121121-9</u> Serial No.: <u>433</u> Serial No.: <u>118</u> Serial No.: <u>0412106049</u> Test Operator : <u>Kittipong T.</u>
--	---

Time, min	O ₂ (%)	NO _x (ppm)	SO ₂ (ppm)	CO (ppm)
11:11 AM	6.49	0.04	284.18	234.62
11:12 AM	6.47	0.01	284.00	235.95
11:13 AM	6.47	0.05	284.10	233.96
11:14 AM	6.47	0.05	284.30	233.46
11:15 AM	6.48	0.02	284.76	235.12
11:16 AM	6.48	0.05	285.52	235.94
11:17 AM	6.48	0.01	285.51	232.45
11:18 AM	6.47	0.04	286.22	230.94
11:19 AM	6.48	0.01	286.46	230.61
11:20 AM	6.48	0.07	288.30	231.72
11:21 AM	6.46	0.09	288.69	233.74
11:22 AM	6.50	0.50	288.80	244.56
11:23 AM	6.40	0.11	288.09	235.34
11:24 AM	6.49	0.13	288.98	234.98
11:25 AM	6.39	0.13	289.50	232.56
11:26 AM	6.51	0.07	288.06	230.92
11:27 AM	6.48	0.05	287.35	231.76
11:28 AM	6.51	0.03	286.53	230.24
11:29 AM	6.49	0.05	287.46	232.25
11:30 AM	6.50	0.05	288.02	229.06
11:31 AM	6.48	0.01	289.68	223.88
Average	6.48	0.07	286.88	233.05


Signature _____
Miss Katesarin Vorradetwittaya
Environmental Scientist

STAR PETROLEUM REFINING PUBLIC CO., LTD.

EMISSION TEST RESULT

Date: <u>November 6, 2024</u> Start time: <u>11:32 AM</u> O₂ instrument Model: <u>AMI 70</u> NO_x instrument Model: <u>Teledyne 200 EM</u> SO₂ instrument Model: <u>API 100 AH</u> CO instrument Model: <u>THERMO 48 C</u> Fuel Type : <u>Natural Gas</u>	Run # : <u>3</u> Location : <u>SRU</u> Finish time : <u>11:52 AM</u> Serial No.: <u>121121-9</u> Serial No.: <u>433</u> Serial No.: <u>118</u> Serial No.: <u>0412106049</u> Test Operator : <u>Kittipong T.</u>
--	---

Time, min	O ₂ (%)	NO _x (ppm)	SO ₂ (ppm)	CO (ppm)
11:32 AM	6.50	0.00	290.12	225.88
11:33 AM	6.51	0.06	289.94	225.87
11:34 AM	6.51	0.05	288.71	226.38
11:35 AM	6.49	0.06	290.21	226.70
11:36 AM	6.49	0.04	289.76	224.03
11:37 AM	6.49	0.06	289.02	225.70
11:38 AM	6.48	0.05	289.97	225.03
11:39 AM	6.47	0.01	289.29	226.03
11:40 AM	6.52	0.05	289.92	227.03
11:41 AM	6.51	0.06	290.01	232.37
11:42 AM	6.50	0.06	291.02	232.04
11:43 AM	6.52	0.02	292.37	230.19
11:44 AM	6.49	0.05	293.92	230.20
11:45 AM	6.49	0.05	294.34	232.69
11:46 AM	6.48	0.02	293.99	232.19
11:47 AM	6.51	0.05	293.10	231.19
11:48 AM	6.46	0.05	295.14	232.86
11:49 AM	6.52	0.05	296.07	232.36
11:50 AM	6.51	0.05	297.44	232.35
11:51 AM	6.50	0.05	298.37	236.34
11:52 AM	6.51	0.05	298.39	238.00
Average	6.50	0.04	292.43	229.78

Signature 
Miss Katesarin Vorradetwittaya
Environmental Scientist



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STACK EMISSION ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REFERENCE NO.	: Refinery-224003-COA-Stk/PM
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING DATE	: 04/11/2024
RECEIVED DATE	: 08/11/2024	ANALYTICAL DATE	: 11-12/11/2024
REPORT DATE	: 25/11/2024	SAMPLE CONDITION	: Normal
STACK LOCATION	: Boiler#2 Stack	OPERATOR	: Mr. Song Hengchwankun
SOURCE DESCRIPTION	: Combustion	FUEL TYPE	: Natural Gas + Refinery Fuel Gas

STACK DESCRIPTION

Height	: 32.4	m	Gas Velocity	: 12.6	m/s
Diameter	: 1.5	m	Flow rate ⁽¹⁾	: 801.4	Ncu.m/min
Temperature	: 168.0	°C	Excess Oxygen	: 4.2	%

PARAMETER	UNIT	RESULTS ⁽¹⁾		ASSIGNED VALUE ⁽²⁾	STANDARD ⁽³⁾	REFERENCE METHODS
		4.2 % O ₂	7 % O ₂			
Particulate Matter	mg/Ncu.m	2.5	2.1	60	60	US. EPA Method 5



(Miss Pornnapa Budthum)

Analyst

REG.NO.จ-239-จ-0018



(Miss Narisa Poowasanpetch)

Technical Management Team

REG.NO.จ-239-ท-0010

Remark : 1. Reported analysis refers to submitted sample only.

2. This report shall not be reproduced, except in full, without official approval.

3. ⁽¹⁾ At standard pressure of 760 mmHg and temperature of 25 °C, dry basis.

4. ⁽²⁾ Assigned value in EIA Report Expansion 3 of Refinery Plant, B.E. 2561 (2018).

5. ⁽³⁾ Notification of the Ministry of Natural Resources and Environment B.E.2554 (2011).



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SECOT CO., LTD.

239 ถนนริมคลองประปา แขวงบางซื่อ เขตบางซื่อ กรุงเทพฯ 10800

239 RIMKLONGPRAPA ROAD, BANGSUE, BANGKOK 10800, THAILAND

TEL : +66(0) 2959-3600 FAX : +66(0) 2959-3535 E-mail : envserv@secot.co.th

STACK EMISSION ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REFERENCE NO.	: Refinery-224003-COA-Stk/CEMs
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING DATE	: 04/11/2024
RECEIVED DATE	: 15/11/2024	ANALYTICAL DATE	: 18/11/2024-10/12/2024
REPORT DATE	: 10/12/2024	SAMPLE CONDITION	: Normal
STACK LOCATION	: Boiler#2 Stack	OPERATOR	: Mr. Song Hengchwankun
SOURCE DESCRIPTION	: Combustion	FUEL TYPE	: Natural Gas + Refinery Fuel Gas

STACK DESCRIPTION

Height	: 32.4	m	Gas Velocity	: 12.6	m/s
Diameter	: 1.5	m	Flow rate ⁽¹⁾	: 801.4	Ncu.m/min
Temperature	: 168.0	°C	Excess Oxygen	: 4.2	%

PARAMETER	CONCENTRATIONS				EMISSION RATE		REFERENCE METHOD
	RESULTS ⁽¹⁾		ASSIGNED VALUE ⁽²⁾	STANDARD ⁽³⁾	RESULT	ASSIGNED VALUE ⁽²⁾	
	4.2 % O ₂	7 % O ₂	7 % O ₂	7 % O ₂			
	ppm	ppm	ppm	ppm	g/s	g/s	
Sulfur Dioxide (SO ₂)	2.5	2.0	60	60	0.087	0.500	US.EPA Method 6C
Oxide of Nitrogen (NO _x)	86.2	71.7	120	200	2.166	2.620	US.EPA Method 7E
Carbon Monoxide (CO)	0.9	0.7	100	690	0.014	0.200	US.EPA Method 10

(Miss Katesarin Vorradetwittaya)

Environmental Scientist

(Miss Preeda Somjai)

Technical Management Team

Remark : 1. Reported analysis refers to submitted sample only.

2. This report shall not be reproduced, except in full, without official approval.

3. ⁽¹⁾ At standard pressure of 760 mmHg and temperature of 25 °C, dry basis.

4. ⁽²⁾ Assigned value in EIA Report Expasion 3 of Refinery Plant, B.E. 2561 (2018).

5. ⁽³⁾ Notification of the Ministry of Natural Resources and Environment B.E.2554 (2011).

The Monitoring Result of Emission Concentration
Boiler 2
STAR PETROLEUM REFINING PUBLIC CO., LTD.
November 4, 2024

Run Number	Oxygen content (%)		Oxide of Nitrogen (ppm)		
	RM Stack Gas Conc	Corrected Gas Conc	RM Stack Gas Conc	Corrected Gas Conc @Actual O2	Corrected Gas Conc @7% O2
1	4.25	4.20	85.62	85.72	71.35
2	4.25	4.20	86.03	86.13	71.69
3	4.27	4.21	86.57	86.67	72.18
Average	4.26	4.20	86.07	86.17	71.74

Run Number	Oxygen content (%)		Sulfur dioxide (ppm)		
	RM Stack Gas Conc	Corrected Gas Conc	RM Stack Gas Conc	Corrected Gas Conc @Actual O2	Corrected Gas Conc @7% O2
1	4.25	4.20	2.17	2.11	1.76
2	4.25	4.20	2.53	2.47	2.06
3	4.27	4.21	2.82	2.77	2.31
Average	4.26	4.20	2.51	2.45	2.04

Run Number	Oxygen content (%)		Carbonmonoxide (ppm)		
	RM Stack Gas Conc	Corrected Gas Conc	RM Stack Gas Conc	Corrected Gas Conc @Actual O2	Corrected Gas Conc @7% O2
1	4.25	4.20	0.93	0.91	0.76
2	4.25	4.20	0.95	0.93	0.77
3	4.27	4.21	0.84	0.81	0.67
Average	4.26	4.20	0.91	0.88	0.74

STAR PETROLEUM REFINING PUBLIC CO., LTD.

EMISSION TEST RESULT

Date: November 4, 2024 Start time: 12:00 PM O₂ instrument Model: AMI 70 NO_x instrument Model: Teledyne 200 EM SO₂ instrument Model: API 100 AH CO instrument Model: THERMO 48 C Fuel Type : Natural Gas	Run # : 1 Location : Boiler 2 Finish time : 12:20 PM Serial No.: 121121-9 Serial No.: 433 Serial No.: 118 Serial No.: 0412106049 Test Operator : Kittipong T.
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Time, min	O ₂ (%)	NO _x (ppm)	SO ₂ (ppm)	CO (ppm)
12:00 PM	4.37	85.47	1.87	0.98
12:01 PM	4.41	85.30	1.97	0.98
12:02 PM	4.46	85.51	2.00	0.94
12:03 PM	4.49	85.86	2.02	0.81
12:04 PM	4.44	86.02	2.06	0.94
12:05 PM	4.23	85.93	2.03	0.87
12:06 PM	4.30	85.31	1.99	0.94
12:07 PM	4.43	84.83	2.10	0.77
12:08 PM	4.44	84.92	2.15	0.91
12:09 PM	4.33	85.33	2.22	0.97
12:10 PM	4.21	85.51	2.18	0.97
12:11 PM	4.29	85.53	2.18	0.97
12:12 PM	4.29	85.42	2.24	0.97
12:13 PM	4.19	85.06	2.27	0.90
12:14 PM	4.29	84.99	2.25	0.84
12:15 PM	4.19	85.34	2.28	0.94
12:16 PM	4.19	85.74	2.26	0.97
12:17 PM	4.13	86.10	2.35	0.97
12:18 PM	3.99	86.69	2.40	0.97
12:19 PM	3.81	86.74	2.42	0.97
12:20 PM	3.83	86.40	2.42	0.97
Average	4.25	85.62	2.17	0.93


 Signature _____
Miss Katesarin Vorradetwittaya
Environmental Scientist

STAR PETROLEUM REFINING PUBLIC CO., LTD.

EMISSION TEST RESULT

Date: November 4, 2024 Start time: 12:21 PM O₂ instrument Model: AMI 70 NO_x instrument Model: Teledyne 200 EM SO₂ instrument Model: API 100 AH CO instrument Model: THERMO 48 C Fuel Type : Natural Gas	Run # : 2 Location : Boiler 2 Finish time : 12:41 PM Serial No.: 121121-9 Serial No.: 433 Serial No.: 118 Serial No.: 0412106049 Test Operator : Kittipong T.
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Time, min	O ₂ (%)	NO _x (ppm)	SO ₂ (ppm)	CO (ppm)
12:21 PM	3.85	86.27	2.41	0.97
12:22 PM	3.89	86.19	2.43	0.97
12:23 PM	4.08	86.02	2.42	0.97
12:24 PM	4.40	85.70	2.45	0.94
12:25 PM	4.40	85.71	2.49	0.94
12:26 PM	4.39	85.96	2.45	0.90
12:27 PM	4.32	86.43	2.43	0.84
12:28 PM	4.15	86.64	2.52	0.84
12:29 PM	4.27	86.34	2.45	0.94
12:30 PM	4.38	86.00	2.52	0.97
12:31 PM	4.33	85.94	2.56	0.94
12:32 PM	4.07	85.98	2.50	0.97
12:33 PM	4.00	85.76	2.55	0.97
12:34 PM	4.15	85.47	2.53	0.97
12:35 PM	4.42	85.40	2.58	0.97
12:36 PM	4.51	85.56	2.62	0.97
12:37 PM	4.51	85.73	2.63	0.97
12:38 PM	4.43	85.94	2.63	0.97
12:39 PM	4.34	86.10	2.67	0.97
12:40 PM	4.24	86.58	2.59	0.94
12:41 PM	4.20	86.89	2.69	0.94
Average	4.25	86.03	2.53	0.95


 Signature _____
Miss Katesarin Vorradetwittaya
Environmental Scientist

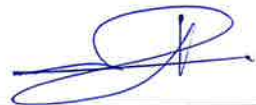
STAR PETROLEUM REFINING PUBLIC CO., LTD.

EMISSION TEST RESULT

Date: November 4, 2024 Start time: 12:42 PM O₂ instrument Model: AMI 70 NO_x instrument Model: Teledyne 200 EM SO₂ instrument Model: API 100 AH CO instrument Model: THERMO 48 C Fuel Type : Natural Gas	Run # : 3 Location : Boiler 2 Finish time : 1:02 PM Serial No.: 121121-9 Serial No.: 433 Serial No.: 118 Serial No.: 0412106049 Test Operator : Kittipong T.
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Time, min	O ₂ (%)	NO _x (ppm)	SO ₂ (ppm)	CO (ppm)
12:42 PM	4.31	86.64	2.70	0.97
12:43 PM	4.38	86.35	2.65	0.97
12:44 PM	4.32	86.42	2.70	0.87
12:45 PM	4.27	86.90	2.76	0.77
12:46 PM	4.24	87.15	2.75	0.97
12:47 PM	4.22	86.81	2.80	0.81
12:48 PM	4.29	86.28	2.77	0.77
12:49 PM	4.30	86.13	2.81	0.78
12:50 PM	4.25	86.38	2.80	0.84
12:51 PM	4.28	86.43	2.80	0.91
12:52 PM	4.33	86.37	2.80	0.91
12:53 PM	4.27	86.54	2.80	0.84
12:54 PM	4.20	86.74	2.86	0.88
12:55 PM	4.22	86.88	2.87	0.84
12:56 PM	4.23	86.68	2.88	0.78
12:57 PM	4.37	86.37	2.90	0.78
12:58 PM	4.33	86.38	2.88	0.78
12:59 PM	4.33	86.49	2.93	0.78
1:00 PM	4.25	86.60	2.89	0.78
1:01 PM	4.20	86.73	2.90	0.85
1:02 PM	4.15	86.64	2.96	0.85
Average	4.27	86.57	2.82	0.84

Signature



Miss Katesarin Vorradetwittaya

Environmental Scientist



บริษัท ซีคอต จำกัด

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STACK EMISSION ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REFERENCE NO.	: Refinery-224003-COA-Stk/PM
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING DATE	: 19/12/2024
RECEIVED DATE	: 20/12/2024	ANALYTICAL DATE	: 20-21/12/2024
REPORT DATE	: 26/12/2024	SAMPLE CONDITION	: Normal
STACK LOCATION	: Boiler#3 Stack	OPERATOR	: Mr. Song Hengchwankun
SOURCE DESCRIPTION	: Combustion	FUEL TYPE	: Natural Gas + Refinery Fuel Gas
STACK DESCRIPTION			

Height	: 32.4	m	Gas Velocity	: 9.8	m/s
Diameter	: 1.5	m	Flow rate ⁽¹⁾	: 629.5	Ncu.m/min
Temperature	: 159.8	°C	Excess Oxygen	: 4.8	%

PARAMETER	UNIT	RESULTS ⁽¹⁾		ASSIGNED VALUE ⁽²⁾	STANDARD ⁽³⁾	REFERENCE METHODS
		4.8 % O ₂	7 % O ₂			
Particulate Matter	mg/Ncu.m	1.7	1.4	20	60	US. EPA Method 5



(Miss Pornnapha Budthum)

Analyst

REG.NO.จ-239-ก-0018



(Miss Narisa Poowasanpetch)

Technical Management Team

REG.NO.จ-239-ก-0010

Remark : 1. Reported analysis refers to submitted sample only.

2. This report shall not be reproduced, except in full, without official approval.

3. ⁽¹⁾ At standard pressure of 760 mmHg and temperature of 25 °C, dry basis.

4. ⁽²⁾ Assigned value in EIA Report Expansion 3 of Refinery Plant, B.E. 2561 (2018).

5. ⁽³⁾ Notification of the Ministry of Natural Resources and Environment B.E.2554 (2011).



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TEL : +66(0) 2959-3600 FAX : +66(0) 2959-3535 E-mail : envserv@secot.co.th

STACK EMISSION ANALYSIS REPORT


CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REFERENCE NO.	: Refinery-224003-COA-Stk/CEMs
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING DATE	: 19/12/2024
RECEIVED DATE	: 25/12/2024	ANALYTICAL DATE	: 26/12/2024
REPORT DATE	: 06/01/2025	SAMPLE CONDITION	: Normal
STACK LOCATION	: Boiler#3 Stack	OPERATOR	: Mr. Song Hengchwankun
SOURCE DESCRIPTION	: Combustion	FUEL TYPE	: Natural Gas + Refinery Fuel Gas
STACK DESCRIPTION			

Height	: 32.4	m	Gas Velocity	: 9.8	m/s
Diameter	: 1.5	m	Flow rate ⁽¹⁾	: 629.5	Ncu.m/min
Temperature	: 159.8	°C	Excess Oxygen	: 4.8	%

PARAMETER	CONCENTRATIONS				EMISSION RATE		REFERENCE METHOD
	RESULTS ⁽¹⁾		ASSIGNED VALUE ⁽²⁾	STANDARD ⁽³⁾	RESULT	ASSIGNED VALUE ⁽²⁾	
	4.8 % O ₂	7 % O ₂	7 % O ₂	7 % O ₂			
	ppm	ppm	ppm	ppm	g/s	g/s	
Sulfur Dioxide (SO ₂)	0.10	0.08	60	60	0.003	1.000	US.EPA Method 6C
Oxide of Nitrogen (NO _x)	54.26	46.9	120	200	1.072	2.200	US.EPA Method 7E
Carbon Monoxide (CO)	1.26	1.09	100	690	0.016	0.200	US.EPA Method 10


(Miss Katesarin Vorradetwittaya)

Environmental Scientist


(Miss Preeda Somjai)

Technical Management Team

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3. ⁽¹⁾ At standard pressure of 760 mmHg and temperature of 25 °C, dry basis.

4. ⁽²⁾ Assigned value in EIA Report Expansion 3 of Refinery Plant, B.E. 2561 (2018).

5. ⁽³⁾ Notification of the Ministry of Natural Resources and Environment B.E.2554 (2011).

The Monitoring Result of Emission Concentration
Boiler 3
STAR PETROLEUM REFINING PUBLIC CO., LTD.
December 19, 2024

Run Number	Oxygen content (%)		Oxide of Nitrogen (ppm)		
	RM Stack Gas Conc	Corrected Gas Conc	RM Stack Gas Conc	Corrected Gas Conc @Actual O2	Corrected Gas Conc @7% O2
1	4.79	4.75	54.49	54.51	46.92
2	4.89	4.85	54.09	54.11	46.86
3	4.89	4.85	54.15	54.17	46.91
Average	4.86	4.82	54.24	54.26	46.90

Run Number	Oxygen content (%)		Sulfur dioxide (ppm)		
	RM Stack Gas Conc	Corrected Gas Conc	RM Stack Gas Conc	Corrected Gas Conc @Actual O2	Corrected Gas Conc @7% O2
1	4.79	4.75	0.06	0.04	0.03
2	4.89	4.85	0.17	0.14	0.12
3	4.89	4.85	0.14	0.11	0.10
Average	4.86	4.82	0.12	0.10	0.08

Run Number	Oxygen content (%)		Carbonmonoxide (ppm)		
	RM Stack Gas Conc	Corrected Gas Conc	RM Stack Gas Conc	Corrected Gas Conc @Actual O2	Corrected Gas Conc @7% O2
1	4.79	4.75	1.31	1.25	1.08
2	4.89	4.85	1.31	1.26	1.09
3	4.89	4.85	1.32	1.27	1.10
Average	4.86	4.82	1.31	1.26	1.09

STAR PETROLEUM REFINING PUBLIC CO., LTD.

EMISSION TEST RESULT

Date: <u>December 19, 2024</u> Start time: <u>11:20 AM</u> O₂ instrument Model: <u>AMI 70</u> NO_x instrument Model: <u>Teledyne 200 EM</u> SO₂ instrument Model: <u>API 100 AH</u> CO instrument Model: <u>THERMO 48 C</u> Fuel Type : <u>Natural Gas</u>	Run # : <u>1</u> Location : <u>Boiler 3</u> Finish time : <u>11:40 AM</u> Serial No.: <u>071023-47</u> Serial No.: <u>435</u> Serial No.: <u>058</u> Serial No.: <u>1070</u> Test Operator : <u>Kittipong T.</u>
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Time, min	O ₂ (%)	NO _x (ppm)	SO ₂ (ppm)	CO (ppm)
11:20 AM	4.70	53.80	0.04	1.24
11:21 AM	4.78	53.96	0.04	1.31
11:22 AM	4.80	54.09	0.04	1.31
11:23 AM	4.86	54.11	0.03	1.31
11:24 AM	4.95	54.04	0.02	1.31
11:25 AM	4.82	54.33	0.01	1.31
11:26 AM	4.88	54.57	0.01	1.31
11:27 AM	4.75	54.54	0.01	1.31
11:28 AM	4.69	54.58	0.01	1.31
11:29 AM	4.73	54.53	0.03	1.31
11:30 AM	4.69	54.17	0.04	1.31
11:31 AM	4.85	53.94	0.04	1.31
11:32 AM	4.91	54.10	0.07	1.31
11:33 AM	4.80	54.69	0.07	1.31
11:34 AM	4.92	55.02	0.08	1.31
11:35 AM	4.84	55.10	0.09	1.31
11:36 AM	4.70	55.39	0.09	1.31
11:37 AM	4.66	55.27	0.10	1.31
11:38 AM	4.63	54.87	0.11	1.31
11:39 AM	4.81	54.67	0.12	1.31
11:40 AM	4.88	54.43	0.13	1.31
Average	4.79	54.49	0.06	1.31

Signature



Miss Katesarin Vorradetwittaya

Environmental Scientist

STAR PETROLEUM REFINING PUBLIC CO., LTD.

EMISSION TEST RESULT

Date: December 19, 2024 Start time: 11:41 AM O₂ instrument Model: AMI 70 NO_x instrument Model: Teledyne 200 EM SO₂ instrument Model: API 100 AH CO instrument Model: THERMO 48 C Fuel Type : Natural Gas	Run # : 2 Location : Boiler 3 Finish time : 12:01 PM Serial No.: 071023-47 Serial No.: 435 Serial No.: 058 Serial No.: 1070 Test Operator : Kittipong T.
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Time, min	O ₂ (%)	NO _x (ppm)	SO ₂ (ppm)	CO (ppm)
11:41 AM	4.89	53.95	0.13	1.31
11:42 AM	4.81	53.69	0.11	1.31
11:43 AM	4.84	53.37	0.12	1.31
11:44 AM	4.88	53.19	0.13	1.31
11:45 AM	5.05	53.49	0.13	1.31
11:46 AM	5.05	53.72	0.13	1.31
11:47 AM	4.83	53.81	0.16	1.31
11:48 AM	4.87	53.94	0.16	1.31
11:49 AM	4.94	53.95	0.15	1.31
11:50 AM	4.93	54.29	0.17	1.31
11:51 AM	4.87	54.41	0.19	1.31
11:52 AM	4.78	53.99	0.19	1.31
11:53 AM	4.76	53.58	0.19	1.31
11:54 AM	4.71	53.50	0.18	1.31
11:55 AM	4.83	54.06	0.19	1.31
11:56 AM	4.94	54.66	0.21	1.31
11:57 AM	4.94	55.10	0.21	1.31
11:58 AM	4.94	55.35	0.21	1.31
11:59 AM	4.94	55.01	0.21	1.31
12:00 PM	4.88	54.62	0.21	1.31
12:01 PM	5.07	54.29	0.21	1.31
Average	4.89	54.09	0.17	1.31

Signature



Miss Katesarin Vorradetwittaya

Environmental Scientist

STAR PETROLEUM REFINING PUBLIC CO., LTD.

EMISSION TEST RESULT

Date: <u>December 19, 2024</u> Start time: <u>12:02 PM</u> O₂ instrument Model: <u>AMI 70</u> NO_x instrument Model: <u>Teledyne 200 EM</u> SO₂ instrument Model: <u>API 100 AH</u> CO instrument Model: <u>THERMO 48 C</u> Fuel Type : <u>Natural Gas</u>	Run # : <u>3</u> Location : <u>Boiler 3</u> Finish time : <u>12:22 PM</u> Serial No.: <u>071023-47</u> Serial No.: <u>435</u> Serial No.: <u>058</u> Serial No.: <u>1070</u> Test Operator : <u>Kittipong T.</u>
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Time, min	O ₂ (%)	NO _x (ppm)	SO ₂ (ppm)	CO (ppm)
12:02 PM	4.95	54.11	0.21	1.31
12:03 PM	4.93	54.40	0.21	1.31
12:04 PM	4.98	54.49	0.21	1.31
12:05 PM	4.95	54.20	0.22	1.31
12:06 PM	4.90	54.00	0.22	1.31
12:07 PM	4.88	53.98	0.22	1.31
12:08 PM	4.85	53.71	0.22	1.31
12:09 PM	4.95	53.44	0.22	1.31
12:10 PM	4.92	53.48	0.23	1.31
12:11 PM	4.90	53.51	0.23	1.31
12:12 PM	4.78	53.57	0.10	1.31
12:13 PM	4.75	53.59	0.06	1.31
12:14 PM	4.73	53.80	0.07	1.31
12:15 PM	4.80	54.17	0.06	1.31
12:16 PM	4.86	54.27	0.06	1.31
12:17 PM	4.85	54.57	0.06	1.31
12:18 PM	4.86	54.74	0.06	1.31
12:19 PM	4.91	54.72	0.06	1.31
12:20 PM	5.00	54.82	0.07	1.31
12:21 PM	4.96	54.77	0.07	1.37
12:22 PM	5.02	54.72	0.07	1.42
Average	4.89	54.15	0.14	1.32

Signature



Miss Katesarin Vorradetwittaya

Environmental Scientist



บริษัท ซีคอต จำกัด

SECOT CO., LTD.

239 ถนนริมคลองประปา แขวงบางซื่อ เขตบางซื่อ กรุงเทพฯ 10800

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TEL : +66(0) 2959-3600 FAX : +66(0) 2959-3535 E-mail : envserv@secot.co.th

STACK EMISSION ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REFERENCE NO.	: Refinery-224003-COA-Stk/PM
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING DATE	: 05/11/2024
RECEIVED DATE	: 08/11/2024	ANALYTICAL DATE	: 11-12/11/2024
REPORT DATE	: 25/11/2024	SAMPLE CONDITION	: Normal
STACK LOCATION	: HRSG#2 Stack	OPERATOR	: Mr. Song Hengchwankun
SOURCE DESCRIPTION	: Combustion	FUEL TYPE	: Natural Gas + Refinery Fuel Gas

STACK DESCRIPTION

Height	: 21.7	m	Gas Velocity	: 15.7	m/s
Diameter	: 3.0	m	Flow rate ⁽¹⁾	: 3,610	Ncu.m/min
Temperature	: 196.4	°C	Excess Oxygen	: 14.3	%

PARAMETER	UNIT	RESULTS ⁽¹⁾		ASSIGNED VALUE ⁽²⁾	STANDARD ⁽³⁾	REFERENCE METHODS
		14.3 % O ₂	7 % O ₂			
Particulate Matter	mg/Ncu.m	1.5	3.2	60	60	US. EPA Method 5

Pornnapa Budthum.

(Miss Pornnapa Budthum)

Analyst

REG.NO.จ-239-ก-0018

Narisa Poowasanpetch

(Miss Narisa Poowasanpetch)

Technical Management Team

REG.NO.จ-239-ก-0010

Remark : 1. Reported analysis refers to submitted sample only.

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3. ⁽¹⁾ At standard pressure of 760 mmHg and temperature of 25 °C, dry basis.

4. ⁽²⁾ Assigned value in EIA Report Expansion 3 of Refinery Plant, B.E. 2561 (2018).

5. ⁽³⁾ Notification of the Ministry of Natural Resources and Environment B.E.2554 (2011).



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STACK EMISSION ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REFERENCE NO.	: Refinery-224003-COA-Stk/CEMs
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING DATE	: 05/11/2024
RECEIVED DATE	: 15/11/2024	ANALYTICAL DATE	: 18/11/2024-10/12/2024
REPORT DATE	: 10/12/2024	SAMPLE CONDITION	: Normal
STACK LOCATION	: HRSG#2 Stack	OPERATOR	: Mr. Song Hengchwankun
SOURCE DESCRIPTION	: Combustion	FUEL TYPE	: Natural Gas + Refinery Fuel Gas

STACK DESCRIPTION

Height	: 21.7	m	Gas Velocity	: 15.7	m/s
Diameter	: 3.0	m	Flow rate ⁽¹⁾	: 3,610	Ncu.m/min
Temperature	: 196.4	°C	Excess Oxygen	: 14.3	%

PARAMETER	CONCENTRATIONS				EMISSION RATE		REFERENCE METHOD
	RESULTS ⁽¹⁾		ASSIGNED VALUE ⁽²⁾	STANDARD ⁽³⁾	RESULT	ASSIGNED VALUE ⁽²⁾	
	14.3 % O ₂	7 % O ₂	7 % O ₂	7 % O ₂			
	ppm	ppm	ppm	ppm	g/s	g/s	
Sulfur Dioxide (SO ₂)	0.02	0.05	10	60	0.003	0.200	US.EPA Method 6C
Oxide of Nitrogen (NO _x)	50.7	107.2	160	200	5.739	5.750	US.EPA Method 7E
Carbon Monoxide (CO)	2.5	5.2	100	690	0.172	1.000	US.EPA Method 10

(Miss Katesarin Vorradetwittaya)

Environmental Scientist

(Miss Preeda Somjai)

Technical Management Team

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The Monitoring Result of Emission Concentration
HRSG 2
STAR PETROLEUM REFINING PUBLIC CO., LTD.
November 5, 2024

Run Number	Oxygen content (%)		Oxide of Nitrogen (ppm)		
	RM Stack Gas Conc	Corrected Gas Conc	RM Stack Gas Conc	Corrected Gas Conc @Actual O2	Corrected Gas Conc @7% O2
1	14.52	14.36	49.40	49.42	105.04
2	14.49	14.32	51.18	51.20	108.16
3	14.50	14.32	51.32	51.34	108.45
Average	14.50	14.33	50.63	50.65	107.22

Run Number	Oxygen content (%)		Sulfur dioxide (ppm)		
	RM Stack Gas Conc	Corrected Gas Conc	RM Stack Gas Conc	Corrected Gas Conc @Actual O2	Corrected Gas Conc @7% O2
1	14.52	14.36	0.03	0.03	0.06
2	14.49	14.32	0.03	0.02	0.04
3	14.50	14.32	0.03	0.02	0.04
Average	14.50	14.33	0.03	0.02	0.05

Run Number	Oxygen content (%)		Carbonmonoxide (ppm)		
	RM Stack Gas Conc	Corrected Gas Conc	RM Stack Gas Conc	Corrected Gas Conc @Actual O2	Corrected Gas Conc @7% O2
1	14.52	14.36	2.46	2.41	5.12
2	14.49	14.32	2.58	2.53	5.34
3	14.50	14.32	2.46	2.42	5.11
Average	14.50	14.33	2.50	2.45	5.19

STAR PETROLEUM REFINING PUBLIC CO., LTD.

EMISSION TEST RESULT

Date: November 5, 2024 Start time: 10:40 AM O₂ instrument Model: AMI 70 NO_x instrument Model: API 200 AH SO₂ instrument Model: API 100 AH CO instrument Model: THERMO 48 C Fuel Type : Natural Gas	Run # : 1 Location : HRSG 2 Finish time : 11:00 AM Serial No.: 161212-13 Serial No.: 314 Serial No.: 058 Serial No.: 78253-388 Test Operator : Song H.
--	---

Time, min	O ₂ (%)	NO _x (ppm)	SO ₂ (ppm)	CO (ppm)
10:40 AM	14.51	48.49	0.03	2.10
10:41 AM	14.50	48.52	0.03	2.28
10:42 AM	14.52	48.42	0.03	2.52
10:43 AM	14.50	48.48	0.03	2.70
10:44 AM	14.48	48.94	0.03	2.70
10:45 AM	14.51	49.30	0.03	2.70
10:46 AM	14.52	49.25	0.03	2.70
10:47 AM	14.53	49.13	0.03	2.65
10:48 AM	14.50	49.21	0.03	2.32
10:49 AM	14.53	49.36	0.03	2.10
10:50 AM	14.54	49.69	0.03	2.10
10:51 AM	14.54	50.00	0.03	2.10
10:52 AM	14.57	49.69	0.03	2.15
10:53 AM	14.55	49.22	0.03	2.43
10:54 AM	14.54	49.02	0.03	2.60
10:55 AM	14.52	48.99	0.03	2.60
10:56 AM	14.51	49.33	0.03	2.60
10:57 AM	14.50	49.93	0.03	2.60
10:58 AM	14.49	50.68	0.03	2.60
10:59 AM	14.49	50.70	0.03	2.60
11:00 AM	14.49	51.03	0.03	2.60
Average	14.52	49.40	0.03	2.46


 Signature _____
 Miss Katesarin Vorradetwittaya
 Environmental Scientist

STAR PETROLEUM REFINING PUBLIC CO., LTD.

EMISSION TEST RESULT

Date: November 5, 2024 Start time: 11:01 AM O₂ instrument Model: AMI 70 NO_x instrument Model: API 200 AH SO₂ instrument Model: API 100 AH CO instrument Model: THERMO 48 C Fuel Type : Natural Gas	Run # : 2 Location : HRSG 2 Finish time : 11:21 AM Serial No.: 161212-13 Serial No.: 314 Serial No.: 058 Serial No.: 78253-388 Test Operator : Song H.
--	---

Time, min	O ₂ (%)	NO _x (ppm)	SO ₂ (ppm)	CO (ppm)
11:01 AM	14.49	50.75	0.03	2.60
11:02 AM	14.49	50.90	0.03	2.60
11:03 AM	14.49	51.33	0.03	2.60
11:04 AM	14.49	51.28	0.03	2.60
11:05 AM	14.49	51.07	0.03	2.60
11:06 AM	14.49	51.12	0.03	2.60
11:07 AM	14.49	50.97	0.03	2.60
11:08 AM	14.49	50.71	0.03	2.60
11:09 AM	14.49	51.18	0.03	2.60
11:10 AM	14.49	51.04	0.03	2.60
11:11 AM	14.49	51.17	0.03	2.60
11:12 AM	14.49	51.47	0.03	2.60
11:13 AM	14.49	51.37	0.03	2.60
11:14 AM	14.49	51.53	0.03	2.60
11:15 AM	14.49	51.60	0.03	2.60
11:16 AM	14.49	51.60	0.03	2.59
11:17 AM	14.50	51.55	0.03	2.50
11:18 AM	14.49	51.05	0.03	2.50
11:19 AM	14.49	51.14	0.03	2.50
11:20 AM	14.49	50.98	0.03	2.50
11:21 AM	14.49	50.87	0.03	2.50
Average	14.49	51.18	0.03	2.58

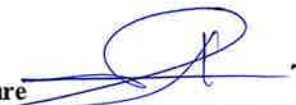

 Signature _____
Miss Katesarin Vorradetwittaya
Environmental Scientist

STAR PETROLEUM REFINING PUBLIC CO., LTD.

EMISSION TEST RESULT

Date: <u>November 5, 2024</u> Start time: <u>11:22 AM</u> O₂ instrument Model: <u>AMI 70</u> NO_x instrument Model: <u>API 200 AH</u> SO₂ instrument Model: <u>API 100 AH</u> CO instrument Model: <u>THERMO 48 C</u> Fuel Type : <u>Natural Gas</u>	Run # : <u>3</u> Location : <u>HRSG 2</u> Finish time : <u>11:42 AM</u> Serial No.: <u>161212-13</u> Serial No.: <u>314</u> Serial No.: <u>058</u> Serial No.: <u>78253-388</u> Test Operator : <u>Song H.</u>
---	---

Time, min	O ₂ (%)	NO _x (ppm)	SO ₂ (ppm)	CO (ppm)
11:22 AM	14.49	51.36	0.03	2.50
11:23 AM	14.49	50.94	0.03	2.50
11:24 AM	14.49	51.14	0.03	2.50
11:25 AM	14.49	51.07	0.03	2.50
11:26 AM	14.49	50.96	0.03	2.50
11:27 AM	14.49	51.05	0.03	2.50
11:28 AM	14.50	51.31	0.03	2.50
11:29 AM	14.49	51.28	0.03	2.50
11:30 AM	14.49	51.12	0.03	2.50
11:31 AM	14.49	51.40	0.03	2.50
11:32 AM	14.49	51.04	0.03	2.47
11:33 AM	14.49	51.45	0.03	2.46
11:34 AM	14.50	51.76	0.03	2.43
11:35 AM	14.49	51.70	0.03	2.43
11:36 AM	14.54	51.58	0.03	2.40
11:37 AM	14.53	51.49	0.03	2.40
11:38 AM	14.51	51.63	0.03	2.41
11:39 AM	14.49	51.49	0.03	2.41
11:40 AM	14.49	51.09	0.03	2.41
11:41 AM	14.49	51.44	0.03	2.41
11:42 AM	14.49	51.51	0.03	2.41
Average	14.50	51.32	0.03	2.46


 Signature _____
Miss Katesarin Vorradetwittaya
Environmental Scientist



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STACK EMISSION ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REF. NO.	: Refinery-224003-COA-Stk/Bz
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING DATE	: 05/11/2024
RECEIVED DATE	: 07/11/2024	ANALYTICAL DATE	: 13/11/2024
REPORT DATE	: 19/11/2024	SAMPLE CONDITION	: Normal
STACK LOCATION	: VRU Stack	OPERATOR	: Mr. Song Hengchwankun
SOURCE DESCRIPTION	: Process	FUEL TYPE	: -

STACK DESCRIPTION

Height	: 10.0	m.	Velocity ⁽¹⁾	: 3.5	m/s
Diameter	: 0.25	m.	Flow Rate ⁽¹⁾	: 9.5	Nm ³ /min
Temperature ⁽¹⁾	: 34.0	°C	Excess Oxygen ⁽¹⁾	: 20.6	%

PARAMETER	UNIT	RESULTS		ASSIGN VALUE ⁽²⁾	STANDARD	REFERENCE METHODS
		INLET	OUTLET			
Benzene	ppm	206.70	<0.06	-	-	US. EPA Method 18
	mg/l	0.66	<0.0002	0.21	-	
	g/s	-	<0.00003	0.017	-	

Sudaporn S.

(Miss Sudaporn Soonthorn)

Analyst

Narisa Poowasanpetch

(Miss Narisa Poowasanpetch)

Technical Management Team

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4. ⁽²⁾ Assigned value in EIA Report Expansion 3 of Refinery Plant, B.E. 2561 (2018).



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STACK EMISSION ANALYSIS REPORT

CLIENT NAME : Star Petroleum Refining Public Co., Ltd. REF. NO. : Refinery-224003-COA-Stk/TVOC
SAMPLING BY : SECOT Co., Ltd. SAMPLING DATE : 05/11/2024
RECEIVED DATE : 07/11/2024 ANALYTICAL DATE : 08/11/2024
REPORT DATE : 19/11/2024 SAMPLE CONDITION : Normal
STACK LOCATION : VRU Stack OPERATOR : Mr. Song Hengchwankun
SOURCE DESCRIPTION : Process FUEL TYPE : -

STACK DESCRIPTION

Height : 10.0 m. Velocity⁽¹⁾ : 3.5 m/s
Diameter : 0.25 m. Flow Rate⁽¹⁾ : 9.5 Nm³/min
Temperature⁽¹⁾ : 34.0 °C Excess Oxygen⁽¹⁾ : 20.6 %

PARAMETER	UNIT	RESULTS		ASSIGN VALUE ⁽²⁾	STANDARD ⁽³⁾	REFERENCE METHODS
		INLET	OUTLET			
TVOCs	ppm	38,050	53.50	-	-	US. EPA Method 25A
	mg/l	68.47	0.096	15	17	
	g/s	-	0.015	1.212	-	

Sudaporn S.
(Miss Sudaporn Soonthorn)

Analyst

Narisa Poowasanpetch
(Miss Narisa Poowasanpetch)

Technical Management Team

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 4. ⁽²⁾ Assigned value in EIA Report Expansion 3 of Refinery Plant, B.E. 2561 (2018).
 5. ⁽³⁾ Notification of the Ministry of Natural Resources and Environment B.E.2553 (2010).

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WATER AND WASTEWATER ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No.	: 1374/67
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Grab
SAMPLING DATE	: 04/07/2024	SAMPLING TIME	: 10:34
RECEIVED DATE	: 05/07/2024	ANALYTICAL DATE	: 05-13/07/2024
REPORT DATE	: 13/07/2024	SITE OPERATOR	: Miss Wiraya Patchimboon
SAMPLE CONDITION	: Normal	FILE CODE	: 224003_WW_July

PARAMETER	UNIT	ANALYSIS METHODS	ND (non-detectable)	STATION	STANDARD ^{1/}
				Near the refinery outfall	
Temperature	°C	2550 B	< 0.5	33.1	≤ 40
pH		4500-H ⁺ B	< 0.10	8.20	5.5-9.0
Total Dissolved Solids	mg/l	2540 C	< 50	1,042	≤ 3,000
Total Suspended Solids	mg/l	2540 D	< 5	10	≤ 50
Ammonia Nitrogen	mg/l	4500-NH ₃ B,C	< 0.02	0.62	-
Sulfide	mg/l	4500-S ²⁻ F	< 0.20	ND	≤ 1
Fat Oil & Grease	mg/l	5520 B	< 0.50	ND	≤ 5
Phenols	mg/l	5530 B,C	< 0.001	ND	≤ 1
BOD ₅	mg/l	5210 B	< 1.0	1.7	≤ 20
COD	mg/l	5220 D	< 40.00	< 40.00	≤ 120
Chromium Hexavalent (Cr ⁶⁺)	mg/l	3500-Cr B	< 0.01	ND	≤ 0.25
Chromium Trivalent (Cr ³⁺)	mg/l	3113 B/Calculation	< 0.001	ND	≤ 0.75
Mercury (Hg)	mg/l	3112 B	< 0.0005	ND	≤ 0.005

REFERENCE : STANDARD METHODS FOR EXAMINATION OF WATER AND WASTEWATER 23rd ED. 2017 (AWWA, APHA, WEF)



(Miss Khemchuda Insorn)

Analyst

REG. NO. ว-239-ท-0005



(Mrs. Araya Tipparuk)

Technical Management Team

REG. NO. ว-239-ท-0004

- Remark :**
1. Reported analysis refers to submitted sample only.
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 3. ^{1/} Notification of the Ministry of Industry, B.E.2560 (2017).
 4. - Not available.



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WATER AND WASTEWATER ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No.	: 1531/67
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Grab
SAMPLING DATE	: 01/08/2024	SAMPLING TIME	: 10:25
RECEIVED DATE	: 02/08/2024	ANALYTICAL DATE	: 02-08/08/2024
REPORT DATE	: 09/08/2024	SITE OPERATOR	: Mr. Aniwat Pimwanna
SAMPLE CONDITION	: Normal	FILE CODE	: 224003_WW_August

PARAMETER	UNIT	ANALYSIS METHODS	ND (non-detectable)	STATION	STANDARD ^{1/}
				Near the refinery outfall	
Temperature	°C	2550 B	< 0.5	31.5	≤ 40
pH	-	4500-H ⁺ B	< 0.10	7.04	5.5-9.0
Total Dissolved Solids	mg/l	2540 C	< 50	1,000	≤ 3,000
Total Suspended Solids	mg/l	2540 D	< 5	< 5	≤ 50
Ammonia Nitrogen	mg/l	4500-NH ₃ B,C	< 0.02	0.10	-
Sulfide	mg/l	4500-S ²⁻ F	< 0.20	ND	≤ 1
Fat Oil & Grease	mg/l	5520 B	< 0.50	ND	≤ 5
Phenols	mg/l	5530 B,C	< 0.001	ND	≤ 1
BOD ₅	mg/l	5210 B	< 1.0	< 1.0	≤ 20
COD	mg/l	5220 D	< 40.00	< 40.00	≤ 120
Chromium Hexavalent (Cr ⁶⁺)	mg/l	3500-Cr B	< 0.01	ND	≤ 0.25
Chromium Trivalent (Cr ³⁺)	mg/l	3113 B/Calculation	< 0.001	ND	≤ 0.75
Mercury (Hg)	mg/l	3112 B	< 0.0005	ND	≤ 0.005

REFERENCE : STANDARD METHODS FOR EXAMINATION OF WATER AND WASTEWATER 23rd ED. 2017 (AWWA, APHA, WEF)



(Miss Khemchuda Insorn)

Analyst

REG. NO. ๖-239-ค-0005



(Mrs. Araya Tipparuk)

Technical Management Team

REG. NO. ๖-239-ค-0004

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 4. - Not available.



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WATER AND WASTEWATER ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No.	: 1843/67
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Grab
SAMPLING DATE	: 05/09/2024	SAMPLING TIME	: 10:30
RECEIVED DATE	: 06/09/2024	ANALYTICAL DATE	: 06-13/09/2024
REPORT DATE	: 16/09/2024	SITE OPERATOR	: Miss Mareeyanee Hawae
SAMPLE CONDITION	: Normal	FILE CODE	: 224003_WW_September

PARAMETER	UNIT	ANALYSIS	ND	STATION	STANDARD ^{1/}
		METHODS	(non-detectable)	Near the refinery outfall	
Temperature	°C	2550 B	< 0.5	30.9	≤ 40
pH	-	4500-H ⁺ B	< 0.10	7.30	5.5-9.0
Total Dissolved Solids	mg/l	2540 C	< 50	514	≤ 3,000
Total Suspended Solids	mg/l	2540 D	< 5	< 5	≤ 50
Ammonia Nitrogen	mg/l	Method 350.2	< 0.02	0.12	-
Sulfide	mg/l	4500-S ²⁻ F	< 0.20	ND	≤ 1
Fat Oil & Grease	mg/l	5520 B	< 0.50	ND	≤ 5
Phenols	mg/l	5530 B,C	< 0.001	ND	≤ 1
BOD ₅	mg/l	5210 B	< 1.0	1.1	≤ 20
COD	mg/l	5220 D	< 40.00	< 40.00	≤ 120
Chromium Hexavalent (Cr ⁶⁺)	mg/l	3500-Cr B	< 0.01	ND	≤ 0.25
Chromium Trivalent (Cr ³⁺)	mg/l	3113 B/Calculation	< 0.001	ND	≤ 0.75
Mercury (Hg)	mg/l	3112 B	< 0.0005	ND	≤ 0.005

REFERENCE : STANDARD METHODS FOR EXAMINATION OF WATER AND WASTEWATER 23rd ED. 2017 (AWWA, APHA, WEF)



(Miss Khemchuda Insorn)

Analyst

REG. NO. ว-239-ก-0005



(Mrs. Araya Tipparuk)

Technical Management Team

REG. NO. ว-239-ก-0004

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 3. ^{1/} Notification of the Ministry of Industry, B.E.2560 (2017).
 4. - Not available.



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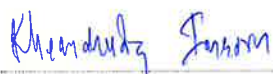
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WATER AND WASTEWATER ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No.	: 2031/67
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Grab
SAMPLING DATE	: 03/10/2024	SAMPLING TIME	: 11:00
RECEIVED DATE	: 04/10/2024	ANALYTICAL DATE	: 04-14/10/2024
REPORT DATE	: 14/10/2024	SITE OPERATOR	: Mr. Aniwat Pimwanna
SAMPLE CONDITION	: Normal	FILE CODE	: 224003_WW_October

PARAMETER	UNIT	ANALYSIS METHODS	ND (non-detectable)	STATION	STANDARD ^{1/}
				Near the refinery outfall	
Temperature	°C	2550 B	< 0.5	30.2	≤ 40
pH	-	4500-H ⁺ B	< 0.10	6.95	5.5-9.0
Total Dissolved Solids	mg/l	2540 C	< 50	966	≤ 3,000
Total Suspended Solids	mg/l	2540 D	< 5	< 5	≤ 50
Ammonia Nitrogen	mg/l	Method 350.2	< 0.02	0.14	-
Sulfide	mg/l	4500-S ²⁻ F	< 0.20	ND	≤ 1
Fat Oil & Grease	mg/l	5520 B	< 0.50	ND	≤ 5
Phenols	mg/l	5530 B,C	< 0.001	ND	≤ 1
BOD ₅	mg/l	5210 B	< 1.0	< 1.0	≤ 20
COD	mg/l	5220 D	< 40.00	< 40.00	≤ 120
Chromium Hexavalent (Cr ⁶⁺)	mg/l	3500-Cr B	< 0.01	ND	≤ 0.25
Chromium Trivalent (Cr ³⁺)	mg/l	3113 B/Calculation	< 0.001	ND	≤ 0.75
Mercury (Hg)	mg/l	3112 B	< 0.0005	ND	≤ 0.005

REFERENCE : STANDARD METHODS FOR EXAMINATION OF WATER AND WASTEWATER 23rd ED. 2017 (AWWA, APHA, WEF)



(Miss Khemchuda Insorn)

Analyst

REG. NO. ว-239-ค-0005



(Mrs. Araya Tipparuk)

Technical Management Team

REG. NO. ว-239-ค-0004

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 3. ^{1/} Notification of the Ministry of Industry, B.E.2560 (2017).
 4. - Not available.



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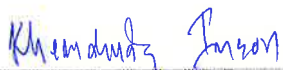
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WATER AND WASTEWATER ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No.	: 2283/67
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Grab
SAMPLING DATE	: 07/11/2024	SAMPLING TIME	: 14:53
RECEIVED DATE	: 08/11/2024	ANALYTICAL DATE	: 08-16/11/2024
REPORT DATE	: 19/11/2024	SITE OPERATOR	: Miss Wiraya Patchimboon
SAMPLE CONDITION	: Normal	FILE CODE	: 224003_WW_November

PARAMETER	UNIT	ANALYSIS METHODS	ND (non-detectable)	STATION	STANDARD ^{1/}
				Near the refinery outfall	
Temperature	°C	2550 B	< 0.5	33.1	≤ 40
pH	-	4500-H ⁺ B	< 0.10	7.66	5.5-9.0
Total Dissolved Solids	mg/l	2540 C	< 50	803	≤ 3,000
Total Suspended Solids	mg/l	2540 D	< 5	<5	≤ 50
Ammonia Nitrogen*	mg/l	Method 350.2	< 0.02	0.30	-
Sulfide	mg/l	4500-S ²⁻ F	< 0.20	ND	≤ 1
Fat Oil & Grease	mg/l	5520 B	< 0.50	ND	≤ 5
Phenols	mg/l	5530 B,C	< 0.001	ND	≤ 1
BOD ₅	mg/l	5210 B	< 1.0	1.5	≤ 20
COD	mg/l	5220 D	< 40.00	< 40.00	≤ 120
Chromium Hexavalent (Cr ⁶⁺)	mg/l	3500-Cr B	< 0.01	ND	≤ 0.25
Chromium Trivalent (Cr ³⁺)	mg/l	3113 B/Calculation	< 0.001	ND	≤ 0.75
Mercury (Hg)	mg/l	3112 B	< 0.0005	ND	≤ 0.005

REFERENCE : STANDARD METHODS FOR EXAMINATION OF WATER AND WASTEWATER 23rd ED. 2017 (AWWA,APHA, WEF)



(Miss Khemchuda Insorn)

Analyst

REG. NO. ว-239-ก-0005



(Mrs. Araya Tipparuk)

Technical Management Team

REG. NO. ว-239-ก-0004

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 4. * Not registered with the Department of Industrial Works.
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WATER AND WASTEWATER ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No.	: 2502/67
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Grab
SAMPLING DATE	: 02/12/2024	SAMPLING TIME	: 11:17
RECEIVED DATE	: 03/12/2024	ANALYTICAL DATE	: 03-11/12/2024
REPORT DATE	: 11/12/2024	SITE OPERATOR	: Mr.Tanachot Changlor
SAMPLE CONDITION	: Normal	FILE CODE	: 224003_WW_December

PARAMETER	UNIT	ANALYSIS METHODS	ND (non-detectable)	STATION	STANDARD ^{1/}
				Near the refinery outfall	
Temperature	°C	2550 B	< 0.5	30.2	≤ 40
pH	-	4500-H ⁺ B	< 0.10	7.77	5.5-9.0
Total Dissolved Solids	mg/l	2540 C	< 50	1,622	≤ 3,000
Total Suspended Solids	mg/l	2540 D	< 5	< 5	≤ 50
Ammonia Nitrogen*	mg/l	Method 350.2	< 0.02	0.11	-
Sulfide	mg/l	4500-S ²⁻ F	< 0.20	ND	≤ 1
Fat Oil & Grease	mg/l	5520 B	< 0.50	ND	≤ 5
Phenols	mg/l	5530 B,C	< 0.001	ND	≤ 1
BOD ₅	mg/l	5210 B	< 1.0	1.3	≤ 20
COD	mg/l	5220 D	< 40.00	40.42	≤ 120
Chromium Hexavalent (Cr ⁶⁺)	mg/l	3500-Cr B	< 0.01	ND	≤ 0.25
Chromium Trivalent (Cr ³⁺)	mg/l	3113 B/Calculation	< 0.001	ND	≤ 0.75
Mercury (Hg)	mg/l	3112 B	< 0.0005	ND	≤ 0.005

REFERENCE : STANDARD METHODS FOR EXAMINATION OF WATER AND WASTEWATER 23rd ED. 2017 (AWWA, APHA, WEF)



(Miss Khemchuda Insorn)

Analyst

REG. NO. ว-239-ค-0005



(Mrs. Araya Tipparuk)

Technical Management Team

REG. NO. ว-239-ค-0004

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WATER AND WASTEWATER ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No.	: 1375/67
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Grab
SAMPLING DATE	: 04/07/2024	SAMPLING TIME	: 15:38, 16:15
RECEIVED DATE	: 05/07/2024	ANALYTICAL DATE	: 05-13/07/2024
REPORT DATE	: 15/07/2024	SITE OPERATOR	: Miss Wiraya Patchimboon
SAMPLE CONDITION	: Normal	FILE CODE	: 224003_SW_July
SAMPLE DESCRIPTION	: 1 = Within IEAT drainage channel upstream from refinery outfall 2 = Within IEAT drainage channel downstream from refinery outfall		

PARAMETER	UNIT	ANALYSIS METHODS	ND (non-detectable)	STATION		STANDARD ^{1/}
				1	2	
Temperature	°C	2550 B	< 0.5	31.4	31.3	-
pH	-	4500-H ⁺ B	< 0.10	8.07	8.09	-
Total Dissolved Solids	mg/l	2540 C	< 50	2,236	2,384	-
Suspended Solids	mg/l	2540 D	< 5	91	72	-
Ammonia Nitrogen	mg/l	Method 350.2	< 0.02	0.89	1.0	-
Sulfide as H ₂ S	mg/l	4500-S ²⁻ F	< 0.20	ND	ND	-
Fat Oil & Grease	mg/l	5520 B	< 0.50	ND	ND	-
Phenols	mg/l	5530 B,C	< 0.001	ND	ND	-
BOD ₅	mg/l	5210 B	< 1.0	1.9	< 1.0	-
COD	mg/l	5220 D	< 40.00	< 40.00	< 40.00	-
Chromium Hexavalent (Cr ⁶⁺)	mg/l	3500-Cr B	< 0.01	ND	ND	-
Chromium Trivalent (Cr ³⁺)	mg/l	3113 B/Calculation	< 0.001	0.003	0.001	-
Mercury (Hg)	mg/l	3112 B	< 0.0005	ND	ND	-

REFERENCE : STANDARD METHODS FOR EXAMINATION OF WATER AND WASTEWATER 23rd ED., 2017 (AWWA, APHA, WEF)



(Miss Khemchuda Insorn)

Analyst



(Mrs. Araya Tippiaruk)

Technical Management Team

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 5. - Not available.



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WATER AND WASTEWATER ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No.	: 1532/67
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Grab
SAMPLING DATE	: 01/08/2024	SAMPLING TIME	: 11:15, 11:30
RECEIVED DATE	: 02/08/2024	ANALYTICAL DATE	: 02-08/08/2024
REPORT DATE	: 09/08/2024	SITE OPERATOR	: Mr. Aniwat Pimwanna
SAMPLE CONDITION	: Normal	FILE CODE	: 224003_SW_August
SAMPLE DESCRIPTION	1 = Within IEAT drainage channel upstream from refinery outfall 2 = Within IEAT drainage channel downstream from refinery outfall		

PARAMETER	UNIT	ANALYSIS METHODS	ND (non-detectable)	STATION		STANDARD ^{1/}
				1	2	
Temperature	°C	2550 B	< 0.5	31.4	31.5	-
pH	-	4500-H ⁺ B	< 0.10	7.12	7.02	-
Total Dissolved Solids	mg/l	2540 C	< 50	1,994	1,700	-
Suspended Solids	mg/l	2540 D	< 5	38	26	-
Ammonia Nitrogen	mg/l	4500-NH ₃ B,C	< 0.02	1.4	1.1	-
Sulfide as H ₂ S	mg/l	4500-S ²⁻ F	< 0.20	ND	ND	-
Fat Oil & Grease	mg/l	5520 B	< 0.50	ND	ND	-
Phenols	mg/l	5530 B,C	< 0.001	ND	ND	-
BOD ₅	mg/l	5210 B	< 1.0	< 1.0	< 1.0	-
COD	mg/l	5220 D	< 40.00	< 40.00	< 40.00	-
Chromium Hexavalent (Cr ⁶⁺)	mg/l	3500-Cr B	< 0.01	ND	ND	-
Chromium Trivalent (Cr ³⁺)	mg/l	3113 B/Calculation	< 0.001	ND	ND	-
Mercury (Hg)	mg/l	3112 B	< 0.0005	ND	ND	-

REFERENCE : STANDARD METHODS FOR EXAMINATION OF WATER AND WASTEWATER 23rd ED., 2017 (AWWA, APHA, WEF)

Khemchuda Insorn

(Miss Khemchuda Insorn)

Analyst

Araya Tipparuk

(Mrs. Araya Tipparuk)

Technical Management Team

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 5. - Not available.



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WATER AND WASTEWATER ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No.	: 1844/67
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Grab
SAMPLING DATE	: 05/09/2024	SAMPLING TIME	: 10:58-11:50
RECEIVED DATE	: 06/09/2024	ANALYTICAL DATE	: 06-12/09/2024
REPORT DATE	: 16/09/2024	SITE OPERATOR	: Miss Mareeyanee Hawae
SAMPLE CONDITION	: Normal	FILE CODE	: 224003_SW_September
SAMPLE DESCRIPTION	: 1 = Within IEAT drainage channel upstream from refinery outfall 2 = Within IEAT drainage channel downstream from refinery outfall		

PARAMETER	UNIT	ANALYSIS METHODS	ND (non-detectable)	STATION		STANDARD ^{1/}
				1	2	
Temperature	°C	2550 B	< 0.5	32.1	31.5	-
pH	-	4500-H ⁺ B	< 0.10	7.53	7.39	-
Total Dissolved Solids	mg/l	2540 C	< 50	1,440	1,264	-
Suspended Solids	mg/l	2540 D	< 5	84	48	-
Ammonia Nitrogen	mg/l	4500-NH ₃ B,C	< 0.02	1.2	1.0	-
Sulfide as H ₂ S	mg/l	4500-S ²⁻ F	< 0.20	ND	ND	-
Fat Oil & Grease	mg/l	5520 B	< 0.50	ND	ND	-
Phenols	mg/l	5530 B,C	< 0.001	ND	ND	-
BOD ₅	mg/l	5210 B	< 1.0	2.8	2.6	-
COD	mg/l	5220 D	< 40.00	< 40.00	< 40.00	-
Chromium Hexavalent (Cr ⁶⁺)	mg/l	3500-Cr B	< 0.01	ND	ND	-
Chromium Trivalent (Cr ³⁺)	mg/l	3113 B/Calculation	< 0.001	0.001	ND	-
Mercury (Hg)	mg/l	3112 B	< 0.0005	ND	ND	-

REFERENCE : STANDARD METHODS FOR EXAMINATION OF WATER AND WASTEWATER 23rd ED. 2017 (AWWA, APHA, WEF)



(Miss Khemchuda Insorn)

Analyst



(Mrs. Araya Tipparuk)

Technical Management Team

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WATER AND WASTEWATER ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No.	: 2030/67
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Grab
SAMPLING DATE	: 03/10/2024	SAMPLING TIME	: 11:20-12:15
RECEIVED DATE	: 04/10/2024	ANALYTICAL DATE	: 04-10/10/2024
REPORT DATE	: 11/10/2024	SITE OPERATOR	: Mr. Aniwat Pimwanna
SAMPLE CONDITION	: Normal	FILE CODE	: 224003_SW_October
SAMPLE DESCRIPTION	1 = Within IEAT drainage channel upstream from refinery outfall 2 = Within IEAT drainage channel downstream from refinery outfall		

PARAMETER	UNIT	ANALYSIS METHODS	ND (non-detectable)	STATION		STANDARD ^{1/}
				1	2	
Temperature	°C	2550 B	< 0.5	28.8	29.0	-
pH	-	4500-H ⁺ B	< 0.10	7.81	7.78	-
Total Dissolved Solids	mg/l	2540 C	< 50	590	620	-
Suspended Solids	mg/l	2540 D	< 5	844	904	-
Ammonia Nitrogen	mg/l	4500-NH ₃ B,C	< 0.02	0.63	0.51	-
Sulfide as H ₂ S	mg/l	4500-S ²⁻ F	< 0.20	ND	ND	-
Fat Oil & Grease	mg/l	5520 B	< 0.50	ND	ND	-
Phenols	mg/l	5530 B,C	< 0.001	ND	ND	-
BOD ₅	mg/l	5210 B	< 1.0	2.1	2.6	-
COD	mg/l	5220 D	< 40.00	< 40.00	< 40.00	-
Chromium Hexavalent (Cr ⁶⁺)	mg/l	3500-Cr B	< 0.01	ND	ND	-
Chromium Trivalent (Cr ³⁺)	mg/l	3113 B/Calculation	< 0.001	0.013	0.025	-
Mercury (Hg)	mg/l	3112 B	< 0.0005	ND	ND	-

REFERENCE : STANDARD METHODS FOR EXAMINATION OF WATER AND WASTEWATER 23rd ED., 2017 (AWWA, APHA, WEF)



(Miss Khemchuda Insorn)

Analyst



(Mrs. Araya Tipparuk)

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WATER AND WASTEWATER ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No.	: 2282/67
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Grab
SAMPLING DATE	: 07/11/2024	SAMPLING TIME	: 10:43, 09:51
RECEIVED DATE	: 08/11/2024	ANALYTICAL DATE	: 08-16/11/2024
REPORT DATE	: 19/11/2024	SITE OPERATOR	: Miss Wiraya Patchimboon
SAMPLE CONDITION	: Normal	FILE CODE	: 224003_SW_November
SAMPLE DESCRIPTION	1 = Within IEAT drainage channel upstream from refinery outfall 2 = Within IEAT drainage channel downstream from refinery outfall		

PARAMETER	UNIT	ANALYSIS METHODS	ND (non-detectable)	STATION		STANDARD ^{1/}
				1	2	
Temperature	°C	2550 B	< 0.5	30.9	30.0	-
pH	-	4500-H ⁺ B	< 0.10	7.73	7.80	-
Total Dissolved Solids	mg/l	2540 C	< 50	2,244	2,946	-
Suspended Solids	mg/l	2540 D	< 5	16	18	-
Ammonia Nitrogen	mg/l	4500-NH ₃ B,C	< 0.02	2.3	2.3	-
Sulfide as H ₂ S	mg/l	4500-S ²⁻ F	< 0.20	ND	ND	-
Fat Oil & Grease	mg/l	5520 B	< 0.50	ND	ND	-
Phenols	mg/l	5530 B,C	< 0.001	ND	ND	-
BOD ₅	mg/l	5210 B	< 1.0	2.8	3.2	-
COD	mg/l	5220 D	< 40.00	< 40.00	< 40.00	-
Chromium Hexavalent (Cr ⁶⁺)	mg/l	3500-Cr B	< 0.01	ND	ND	-
Chromium Trivalent (Cr ³⁺)	mg/l	3113 B/Calculation	< 0.001	0.004	ND	-
Mercury (Hg)	mg/l	3112 B	< 0.0005	ND	ND	-

REFERENCE : STANDARD METHODS FOR EXAMINATION OF WATER AND WASTEWATER 23rd ED., 2017 (AWWA, APHA, WEF)

(Miss Khemchuda Insorn)

Analyst

(Mrs. Araya Tipparuk)

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WATER AND WASTEWATER ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No.	: 2503/67
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Grab
SAMPLING DATE	: 02/12/2024	SAMPLING TIME	: 13:24, 12:12
RECEIVED DATE	: 03/12/2024	ANALYTICAL DATE	: 03-11/12/2024
REPORT DATE	: 11/12/2024	SITE OPERATOR	: Mr.Tanachot Changlor
SAMPLE CONDITION	: Normal	FILE CODE	: 224003_SW_December
SAMPLE DESCRIPTION	1 = Within IEAT drainage channel upstream from refinery outfall 2 = Within IEAT drainage channel downstream from refinery outfall		

PARAMETER	UNIT	ANALYSIS METHODS	ND (non-detectable)	STATION		STANDARD ^{1/}
				1	2	
Temperature	°C	2550 B	< 0.5	33.7	32.8	-
pH	-	4500-H ⁺ B	< 0.10	8.36	8.41	-
Total Dissolved Solids	mg/l	2540 C	< 50	4,024	2,846	-
Suspended Solids	mg/l	2540 D	< 5	26	14	-
Ammonia Nitrogen	mg/l	4500-NH ₃ B,C	< 0.02	1.5	1.1	-
Sulfide as H ₂ S	mg/l	4500-S ²⁻ F	< 0.20	ND	ND	-
Fat Oil & Grease	mg/l	5520 B	< 0.50	ND	ND	-
Phenols	mg/l	5530 B,C	< 0.001	ND	ND	-
BOD ₅	mg/l	5210 B	< 1.0	1.9	1.8	-
COD	mg/l	5220 D	< 40.00	< 40.00	< 40.00	-
Chromium Hexavalent (Cr ⁶⁺)	mg/l	3500-Cr B	< 0.01	ND	ND	-
Chromium Trivalent (Cr ³⁺)	mg/l	3113 B/Calculation	< 0.001	ND	0.001	-
Mercury (Hg)	mg/l	3112 B	< 0.0005	ND	ND	-

REFERENCE : STANDARD METHODS FOR EXAMINATION OF WATER AND WASTEWATER 23rd ED., 2017 (AWWA, APHA, WEF)



(Miss Khemchuda Insorn)

Analyst



(Mrs. Araya Tipparuk)

Technical Management Team

- Remark :**
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 3. ^{1/} Notification of the National Environment Board No.8 B.E.2537 (1994) for Surface Water Class 5.
 4. n¹ means naturally but changing by no more than 3°C.
 5. - Not available.



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WATER AND WASTEWATER ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No.	: 1374/67
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Grab
SAMPLING DATE	: 04/07/2024	SAMPLING TIME	: 09.39-10:15
RECEIVED DATE	: 05/07/2024	ANALYTICAL DATE	: 05-13/07/2024
REPORT DATE	: 15/07/2024	SITE OPERATOR	: Miss Wiraya Patchimboon
SAMPLE CONDITION	: Normal	FILE CODE	: 224003_WW_July
SAMPLE DESCRIPTION	1 = API Separator Effluent 2 = IAF Unit Effluent 3 = Equalization Tank Effluent 4 = Biological Treatment Effluent		

PARAMETER	UNIT	ANALYSIS METHODS	ND (non-detectable)	STATION			
				1	2	3	4
Temperature	°C	2550 B	< 0.5	32.5	26.0	34.8	33.9
pH	-	4500-H ⁺ B	< 0.10	7.04	7.61	9.73	7.88
Total Dissolved Solids	mg/l	2540 C	< 50	1,050	226	1,218	1,228
Suspended Solids	mg/l	2540 D	< 5	32	6	51	7
Fat Oil & Grease	mg/l	5520 B	< 0.50	10.5	ND	1.4	ND
Phenols	mg/l	5530 B,C* / B,D	< 0.001*, < 0.10	1.3	ND	3.9	ND*
Sulfide as H ₂ S	mg/l	4500-S ²⁻ F	< 0.20	0.42	1.2	3.4	0.28
BOD ₅	mg/l	5210 B	< 1.0	69.4	16.4	123	< 1.0
COD	mg/l	5220 D	< 40.00	455	279	507	47.78
Ammonia Nitrogen	mg/l	4500-NH ₃ B,C/Method 350.2	< 0.02	3.5	0.47	10.1	0.05
Chromium Trivalent (Cr ³⁺)	mg/l	3113 B/Calculation	< 0.001	0.001	ND	0.003	ND
Chromium Hexavalent (Cr ⁶⁺)	mg/l	3500-Cr B	< 0.01	ND	ND	ND	ND
Mercury (Hg)	mg/l	3112 B	< 0.0005	0.0093	ND	ND	ND

REFERENCE : STANDARD METHODS FOR EXAMINATION OF WATER AND WASTEWATER 23rd ED. 2017 (AWWA, APHA, WEF)

REFERENCE : US EPA, 1983, Method for Chemical Analysis of Water and Waste, USEPA, EPA 600/4-79/020, Method 350.2.



(Miss Khemchuda Insorn)

Analyst

REG.NO. ๖-239-๓-0005



(Mrs. Araya Tipparuk)

Technical Management Team

REG. NO. ๖-239-๓-0004

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WATER AND WASTEWATER ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No.	: 1531/67
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Grab
SAMPLING DATE	: 01/08/2024	SAMPLING TIME	: 09.30-10:15
RECEIVED DATE	: 02/08/2024	ANALYTICAL DATE	: 02-08/08/2024
REPORT DATE	: 09/08/2024	SITE OPERATOR	: Mr. Aniwat Pimwanna
SAMPLE CONDITION	: Normal	FILE CODE	: 224003_WW_August
SAMPLE DESCRIPTION	1 = API Separator Effluent 2 = IAF Unit Effluent 3 = Equalization Tank Effluent 4 = Biological Treatment Effluent		

PARAMETER	UNIT	ANALYSIS METHODS	ND (non-detectable)	STATION			
				1	2	3	4
Temperature	°C	2550 B	< 0.5	32.3	32.4	31.9	32.3
pH		4500-H ⁺ B	< 0.10	7.03	6.69	8.09	7.16
Total Dissolved Solids	mg/l	2540 C	< 50	1,356	1,070	1,072	960
Suspended Solids	mg/l	2540 D	< 5	14	8	15	< 5
Fat Oil & Grease	mg/l	5520 B	< 0.50	6.9	ND	1.9	ND
Phenols	mg/l	5530 B,C* / B,D	< 0.001*, < 0.10	0.75	0.67	2.4	ND*
Sulfide as H ₂ S	mg/l	4500-S ²⁻ F	< 0.20	0.29	0.72	0.87	ND
BOD ₅	mg/l	5210 B	< 1.0	27.0	9.6	35	< 1.0
COD	mg/l	5220 D	< 40.00	157	187	213	< 40.00
Ammonia Nitrogen	mg/l	4500-NH ₃ B,C/Method 350.2	< 0.02	4.1	3.3	3.3	0.04
Chromium Trivalent (Cr ³⁺)	mg/l	3113 B/Calculation	< 0.001	ND	ND	ND	ND
Chromium Hexavalent (Cr ⁶⁺)	mg/l	3500-Cr B	< 0.01	ND	ND	ND	ND
Mercury (Hg)	mg/l	3112 B	< 0.0005	0.0032	ND	0.0011	ND

REFERENCE : STANDARD METHODS FOR EXAMINATION OF WATER AND WASTEWATER 23rd ED. 2017 (AWWA, APHA, WEF)

REFERENCE : US EPA, 1983, Method for Chemical Analysis of Water and Waste, USEPA, EPA 600/4-79/020, Method 350.2.

(Miss Khemchuda Insorn)

Analyst

REG. NO. ว-239-ท-0005

(Mrs. Araya Tipparuk)

Technical Management Team

REG. NO. ว-239-ท-0004

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3. - Not available.



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WATER AND WASTEWATER ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No.	: 1843/67
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Grab
SAMPLING DATE	: 05/09/2024	SAMPLING TIME	: 09.30-10.15
RECEIVED DATE	: 06/09/2024	ANALYTICAL DATE	: 06-12/09/2024
REPORT DATE	: 16/09/2024	SITE OPERATOR	: Miss Mareeyanee Hawae
SAMPLE CONDITION	: Normal	FILE CODE	: 224003_WW_September
SAMPLE DESCRIPTION	1 = API Separator Effluent 2 = IAF Unit Effluent 3 = Equalization Tank Effluent 4 = Biological Treatment Effluent		

PARAMETER	UNIT	ANALYSIS METHODS	ND (non-detectable)	STATION			
				1	2	3	4
Temperature	°C	2550 B	< 0.5	32.0	25.0	33.7	32.3
pH	-	4500-H ⁺ B	< 0.10	6.66	6.86	6.85	7.03
Total Dissolved Solids	mg/l	2540 C	< 50	472	500	660	588
Suspended Solids	mg/l	2540 D	< 5	32	6	< 5	< 5
Fat Oil & Grease	mg/l	5520 B	< 0.50	4.3	0.85	2.3	ND
Phenols	mg/l	5530 B,C* / B,D	< 0.001*, < 0.10	0.80	0.74	0.94	ND*
Sulfide as H ₂ S	mg/l	4500-S ²⁻ F	< 0.20	ND	ND	ND	ND
BOD ₅	mg/l	5210 B	< 1.0	39.6	18.4	35.4	< 1.0
COD	mg/l	5220 D	< 40.00	179	49.46	142	< 40.00
Ammonia Nitrogen	mg/l	4500-NH ₃ B,C/Method 350.2	< 0.02	1.9	2.9	2.4	0.11
Chromium Trivalent (Cr ³⁺)	mg/l	3113 B/Calculation	< 0.001	ND	ND	ND	ND
Chromium Hexavalent (Cr ⁶⁺)	mg/l	3500-Cr B	< 0.01	ND	ND	ND	ND
Mercury (Hg)	mg/l	3112 B	< 0.0005	0.0094	ND	ND	ND

REFERENCE : STANDARD METHODS FOR EXAMINATION OF WATER AND WASTEWATER 23rd ED, 2017 (AWWA, APHA, WEF)

REFERENCE : US EPA, 1983, Method for Chemical Analysis of Water and Waste, USEPA, EPA 600/4-79/020, Method 350.2.



(Miss Khemchuda Insom)

Analyst

REG. NO. จ-239-ก-0005



(Mrs. Araya Tipparuk)

Technical Management Team

REG. NO. จ-239-ก-0004

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WATER AND WASTEWATER ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No.	: 2031/67
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Grab
SAMPLING DATE	: 03/10/2024	SAMPLING TIME	: 10.00-10.38
RECEIVED DATE	: 04/10/2024	ANALYTICAL DATE	: 04-10/10/2024
REPORT DATE	: 11/10/2024	SITE OPERATOR	: Mr. Aniwat Pimwanna
SAMPLE CONDITION	: Normal	FILE CODE	: 224003_WW_October
SAMPLE DESCRIPTION	1 = API Separator Effluent 2 = IAF Unit Effluent 3 = Equalization Tank Effluent 4 = Biological Treatment Effluent		

PARAMETER	UNIT	ANALYSIS METHODS	ND (non-detectable)	STATION			
				1	2	3	4
Temperature	°C	2550 B	< 0.5	32.0	32.0	36.2	33.4
pH	-	4500-H ⁺ B	< 0.10	7.48	7.56	9.54	7.33
Total Dissolved Solids	mg/l	2540 C	< 50	566	590	798	900
Suspended Solids	mg/l	2540 D	< 5	40	62	23	< 5
Fat Oil & Grease	mg/l	5520 B	< 0.50	6.8	7.6	3.1	ND
Phenols	mg/l	5530 B,C* / B,D	< 0.001*, < 0.10	1.0	0.85	2.2	ND*
Sulfide as H ₂ S	mg/l	4500-S ²⁻ F	< 0.20	0.96	ND	6.0	ND
BOD ₅	mg/l	5210 B	< 1.0	86.5	20.6	43.6	< 1.0
COD	mg/l	5220 D	< 40.00	146	134	164	< 40.00
Ammonia Nitrogen	mg/l	4500-NH ₃ B,C/Method 350.2*	< 0.02	2.9	2.7	3.0	0.13
Chromium Trivalent (Cr ³⁺)	mg/l	3113 B/Calculation	< 0.001	0.007	0.004	ND	ND
Chromium Hexavalent (Cr ⁶⁺)	mg/l	3500-Cr B	< 0.01	ND	ND	ND	ND
Mercury (Hg)	mg/l	3112 B	< 0.0005	0.0060	0.0052	ND	ND

REFERENCE : STANDARD METHODS FOR EXAMINATION OF WATER AND WASTEWATER 23rd ED. 2017 (AWWA, APHA, WEF)

REFERENCE : US EPA, 1983, Method for Chemical Analysis of Water and Waste, USEPA, EPA 600/4-79/020, Method 350.2.



(Miss Khemchuda Insorn)

Analyst

REG. NO. ๖-239-ก-0005



(Mrs. Araya Tipparuk)

Technical Management Team

REG. NO. ๖-239-ก-0004

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3. - Not available.



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WATER AND WASTEWATER ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No.	: 2283/67
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Grab
SAMPLING DATE	: 07/11/2024	SAMPLING TIME	: 14.21-14.45
RECEIVED DATE	: 08/11/2024	ANALYTICAL DATE	: 08-16/11/2024
REPORT DATE	: 16/11/2024	SITE OPERATOR	: Miss Wiraya Patchimboon
SAMPLE CONDITION	: Normal	FILE CODE	: 224003_WW_November
SAMPLE DESCRIPTION	: 1 = API Separator Effluent 2 = IAF Unit Effluent	3 = Equalization Tank Effluent 4 = Biological Treatment Effluent	

PARAMETER	UNIT	ANALYSIS METHODS	ND (non-detectable)	STATION			
				1	2	3	4
Temperature	°C	2550 B	< 0.5	35.4	35.1	35.8	34.0
pH	-	4500-H ⁺ B	< 0.10	7.50	7.58	9.83	7.54
Total Dissolved Solids	mg/l	2540 C	< 50	766	747	897	879
Suspended Solids	mg/l	2540 D	< 5	19	8	14	5
Fat Oil & Grease	mg/l	5520 B	< 0.50	ND	ND	ND	ND
Phenols	mg/l	5530 B,C* / B,D	< 0.001*, < 0.10	0.84	0.42	2.4	ND*
Sulfide as H ₂ S	mg/l	4500-S ²⁻ F	< 0.20	1.1	0.27	0.66	ND
BOD ₅	mg/l	5210 B	< 1.0	80.2	76.4	126	1.1
COD	mg/l	5220 D	< 40.00	179	121	179	< 40.00
Ammonia Nitrogen*	mg/l	4500-NH ₃ B,C/Method 350.2*	< 0.02	10.6	5.0	10.1	0.10*
Chromium Trivalent (Cr ³⁺)	mg/l	3113 B/Calculation	< 0.001	ND	ND	ND	ND
Chromium Hexavalent (Cr ⁶⁺)	mg/l	3500-Cr B	< 0.01	ND	ND	ND	ND
Mercury (Hg)	mg/l	3112 B	< 0.0005	0.0076	ND	0.0014	0.0006

REFERENCE : STANDARD METHODS FOR EXAMINATION OF WATER AND WASTEWATER 23rd ED. 2017 (AWWA, APHA, WEF)

REFERENCE : US EPA, 1983, Method for Chemical Analysis of Water and Waste, USEPA, EPA 600/4-79/020, Method 350.2.



(Miss Khemchuda Insorn)

Analyst

REG. NO. ๖-239-ท-0005



(Mrs. Araya Tipparuk)

Technical Management Team

REG. NO. ๖-239-ท-0004

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4. - Not available.



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WATER AND WASTEWATER ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No.	: 2502/67
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Grab
SAMPLING DATE	: 02/12/2024	SAMPLING TIME	: 10:12-10:47
RECEIVED DATE	: 03/12/2024	ANALYTICAL DATE	: 03-11/12/2024
REPORT DATE	: 11/12/2024	SITE OPERATOR	: Mr.Tanachot Changlor
SAMPLE CONDITION	: Normal	FILE CODE	: 224003_WW_December
SAMPLE DESCRIPTION	: 1 = API Separator Effluent 2 = IAF Unit Effluent	3 = Equalization Tank Effluent 4 = Biological Treatment Effluent	

PARAMETER	UNIT	ANALYSIS METHODS	ND (non-detectable)	STATION			
				1	2	3	4
Temperature	°C	2550 B	< 0.5	33.8	29.7	35.0	32.5
pH	-	4500-H ⁺ B	< 0.10	7.47	7.93	9.28	8.29
Total Dissolved Solids	mg/l	2540 C	< 50	2,188	242	1,954	1,940
Suspended Solids	mg/l	2540 D	< 5	48	< 5	43	11
Fat Oil & Grease	mg/l	5520 B	< 0.50	4.7	ND	0.71	ND
Phenols	mg/l	5530 B,C* / B,D	< 0.001*, < 0.10	0.57	ND	3.7	ND*
Sulfide as H ₂ S	mg/l	4500-S ²⁻ F	< 0.20	1.5	ND	0.76	ND
BOD ₅	mg/l	5210 B	< 1.0	53.6	8.8	78.2	< 1.0
COD	mg/l	5220 D	< 40.00	235	< 40.00	298	< 40.00
Ammonia Nitrogen*	mg/l	4500-NH ₃ B,C/Method 350.2*	< 0.02	6.9	0.90	7.9	0.14*
Chromium Trivalent (Cr ³⁺)	mg/l	3113 B/Calculation	< 0.001	ND	ND	0.003	0.001
Chromium Hexavalent (Cr ⁶⁺)	mg/l	3500-Cr B	< 0.01	ND	ND	ND	ND
Mercury (Hg)	mg/l	3112 B	< 0.0005	0.0058	0.0013	ND	ND

REFERENCE : STANDARD METHODS FOR EXAMINATION OF WATER AND WASTEWATER 23rd ED. 2017 (AWWA, APHA, WEF)

REFERENCE : US EPA, 1983, Method for Chemical Analysis of Water and Waste, USEPA, EPA 600/4-79/020, Method 350.2.



(Miss Khemchuda Insorn)

Analyst

REG. NO. ๖-239-ก-0005



(Mrs. Araya Tipparuk)

Technical Management Team

REG. NO. ๖-239-ก-0004

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WATER AND WASTEWATER ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No.	: 1597/67
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Integrate
SAMPLING DATE	: 08/08/2024	SAMPLING TIME	: 09:24
RECEIVED DATE	: 09/08/2024	ANALYTICAL DATE	: 08-16/08/2024
REPORT DATE	: 17/08/2024	SITE OPERATOR	: Mr. Chitpon Somprasong
SAMPLE CONDITION	: Normal	FILE CODE	: 224003_CW_August

PARAMETER	UNITS	ANALYSIS METHODS	ND (non-detectable)	SATATION	STANDARD ^{1/}
				Ko Saket	
Depth	m.	Measurement	-	2.4	-
Temperature	°C	2550 B	< 0.5	30.7	$\Delta \leq 2$
pH	-	4500-H ⁺ B	< 0.10	8.02	7.0-8.5
Transparency	m.	Secchi Disc	-	1.1	$\Delta \leq 10 \%$
Fat Oil & Grease	mg/l	5520 B	< 0.50	ND	-
Fat Oil & Grease	-	Visual Testing	-	NV	NV
Suspended Solid (SS)	mg/l	2540 D	2.5	10.16	^{2/}
Ammonia Nitrogen	µg/l	4500-NH ₃ F	< 10.0	ND	-
Phenols	mg/l	5530 B-C	< 0.001	ND	≤ 0.03
Dissolved Oxygen	mg/l	4500-O G	< 0.10	5.33	≥ 4
BOD ₅	mg/l	5210 B	< 1.0	< 1.0	-
Salinity	ppt	2520 B	< 0.10	22.8	$\Delta \leq 10 \%$
Total Petroleum Hydrocarbon	µg/l	IOC/GGE(MSI)-III/3	< 0.10	ND	≤ 5
TOC	µg/l	5310 B	< 0.01	1.74	-
Chromium Trivalent (Cr ³⁺)	µg/l	3113 B / Calculation	< 1.00	ND	-
Chromium Hexavalent (Cr ⁶⁺)	µg/l	3113 B	< 1.00	ND	≤ 50
Mercury (Hg)	µg/l	3112 B	< 0.05	ND	≤ 0.1

REFERENCE : STANDARD METHODS FOR EXAMINATION OF WATER AND WASTEWATER 23rd ED. 2017 (AWWA, APHA, WEF)

REFERENCE : Intergovernmental Oceanographic Commission of UNESCO (IOC), 1981



(Miss Khemchuda Insorn)

Analyst



(Mrs. Araya Tipparuk)

Technical Management Team

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3. ^{1/} Notification of the National Environmental Board B.E.2564 (2021) (Class 5).

Δ : Change from natural condition, \leq : Not more than, NV : Not visible, \geq : Not less than.

^{2/} The results should not be changed by more than the sum of daily average and the standard deviation.

Daily average was calculated from hourly measurement or at least 5 samples taken at equal time interval within one day.

4. *TOC analysis was performed by The Office of Public Health and Environmental Technology Services, Faculty of Public Health, Mahidol University.

5. - Not available .



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WATER AND WASTEWATER ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No.	: 2620/67
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Integrate
SAMPLING DATE	: 13/12/2024	SAMPLING TIME	: 10:06
RECEIVED DATE	: 14/12/2024	ANALYTICAL DATE	: 14-25/12/2024
REPORT DATE	: 27/12/2024	SITE OPERATOR	: Mr. Baworn Deechaiya
SAMPLE CONDITION	: Normal	FILE CODE	: 224003_CW_December

PARAMETER	UNITS	ANALYSIS METHODS	ND (non-detectable)	SATATION	STANDARD ^{1/}
				Ko Saket	
Depth	m.	Measurement	-	3.7	-
Temperature	°C	2550 B	< 0.5	28.4	$\Delta \leq 2$
pH	-	4500-H ⁺ B	< 0.10	8.17	7.0-8.5
Transparency	m.	Secchi Disc	-	2.5	$\Delta \leq 10 \%$
Fat Oil & Grease	mg/l	5520 B	< 0.50	ND	-
Fat Oil & Grease	-	Visual Testing	-	NV	NV
Suspended Solid (SS)	mg/l	2540 D	2.5	12.20	^{2/}
Ammonia Nitrogen	µg/l	4500-NH ₃ F	< 10.0	ND	-
Phenols	mg/l	5530 B-C	< 0.001	ND	≤ 0.03
Dissolved Oxygen	mg/l	4500-O G	< 0.10	5.30	≥ 4
BOD ₅	mg/l	5210 B	< 1.0	1.5	-
Salinity	ppt	2520 B	< 0.10	31.8	$\Delta \leq 10 \%$
Total Petroleum Hydrocarbon	µg/l	IOC/GGE(MSI)-III/3	< 0.10	ND	≤ 5
TOC [*]	mg/l	5310 B	< 0.01	2.77	-
Arsenic (As)	µg/l	3114 C	< 0.10	1.42	≤ 10
Chromium Trivalent (Cr ³⁺)	µg/l	3113 B / Calculation	< 1.00	ND	-
Chromium Hexavalent (Cr ⁶⁺)	µg/l	3113 B	< 1.00	ND	≤ 50
Mercury (Hg)	µg/l	3112 B	< 0.05	ND	≤ 0.1
Nickel (Ni)	µg/l	3113 B	< 5.00	ND	-
Vanadium (V)	µg/l	3120 B	< 10.00	ND	-

REFERENCE : STANDARD METHODS FOR EXAMINATION OF WATER AND WASTEWATER 23rd ED. 2017 (AWWA, APHA, WEF)

REFERENCE : Intergovernmental Oceanographic Commission of UNESCO (IOC), 1981



(Miss Khemchuda Insorn)

Analyst



(Mrs. Araya Tipparuk)

Technical Management Team

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WATER AND WASTEWATER ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No. :	1597/67
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Integrate
SAMPLING DATE	: 08/08/2024	SAMPLING TIME	: 09:44
RECEIVED DATE	: 09/08/2024	ANALYTICAL DATE	: 08-16/08/2024
REPORT DATE	: 17/08/2024	SITE OPERATOR	: Mr. Chitpon Somprasong
SAMPLE CONDITION	: Normal	FILE CODE	: 224003_CW_August

PARAMETER	UNITS	ANALYSIS METHODS	ND (non-detectable)	SATATION	STANDARD ^{1/}
				Had Sai Thong Beach	
Depth	m.	Measurement	-	2.5	-
Temperature	°C	2550 B	< 0.5	30.6	$\Delta \leq 1$
Transparency	m.	Secchi Disc	-	1.0	$\Delta \leq 10 \%$
pH	-	4500-H ⁺ B	< 0.10	8.14	7.0-8.5
Fat Oil & Grease	mg/l	5520 B	< 0.50	ND	-
Fat Oil & Grease	-	Visual Testing	-	NV	NV
Suspended Solid (SS)	mg/l	2540 D	2.5	8.40	^{2/}
Ammonia Nitrogen	µg/l	4500-NH ₃ F	< 10.0	17.9	-
Phenols	mg/l	5530 B-C	< 0.001	ND	≤ 0.03
Dissolved Oxygen	mg/l	4500-O G	< 0.10	5.44	≥ 4
BOD ₅	mg/l	5210 B	< 1.0	< 1.0	-
Salinity	ppt	2520 B	< 0.10	21.8	$\Delta \leq 10 \%$
Total Petroleum Hydrocarbon	µg/l	IOC/GGE(MSI)-III/3	< 0.10	ND	≤ 0.5
TOC	mg/l	5310 B	< 0.01	2.01	-
Chromium Trivalent (Cr ³⁺)	µg/l	3113 B / Calculation	< 1.00	ND	-
Chromium Hexavalent (Cr ⁶⁺)	µg/l	3113 B	< 1.00	ND	≤ 50
Mercury (Hg)	µg/l	3112 B	< 0.05	ND	≤ 0.1

REFERENCE : STANDARD METHODS FOR EXAMINATION OF WATER AND WASTEWATER 23rd ED., 2017 (AWWA, APHA, WEF)

REFERENCE : Intergovernmental Oceanographic Commission of UNESCO (IOC), 1981



(Miss Khemchuda Insorn)

Analyst



(Mrs. Araya Tipparuk)

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4. *TOC analysis was performed by The Office of Public Health and Environmental Technology Services, Faculty of Public Health, Mahidol University.

5. - Not available.



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WATER AND WASTEWATER ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No. :	2620/67
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Integrate
SAMPLING DATE	: 13/12/2024	SAMPLING TIME	: 10:22
RECEIVED DATE	: 14/12/2024	ANALYTICAL DATE	: 14-25/12/2024
REPORT DATE	: 27/12/2024	SITE OPERATOR	: Mr. Baworn Deechaiya
SAMPLE CONDITION	: Normal	FILE CODE	: 224003_CW_December

PARAMETER	UNITS	ANALYSIS METHODS	ND (non-detectable)	SATATION	STANDARD ^{1/}
				Had Sai Thong Beach	
Depth	m.	Measurement	-	3.3	-
Temperature	°C	2550 B	< 0.5	28.6	$\Delta \leq 1$
Transparency	m.	Secchi Disc	-	2.5	$\Delta \leq 10 \%$
pH	-	4500-H ⁺ B	< 0.10	8.11	7.0-8.5
Fat Oil & Grease	mg/l	5520 B	< 0.50	ND	-
Fat Oil & Grease	-	Visual Testing	-	NV	NV
Suspended Solid (SS)	mg/l	2540 D	2.5	15.80	^{2/}
Ammonia Nitrogen	µg/l	4500-NH ₃ F	< 10.0	ND	-
Phenols	mg/l	5530 B-C	< 0.001	ND	≤ 0.03
Dissolved Oxygen	mg/l	4500-O G	< 0.10	5.80	≥ 4
BOD ₅	mg/l	5210 B	< 1.0	1.8	-
Salinity	ppt	2520 B	< 0.10	32.7	$\Delta \leq 10 \%$
Total Petroleum Hydrocarbon	µg/l	IOC/GGE(MSI)-III/3	< 0.10	ND	≤ 0.5
TOC [*]	mg/l	5310 B	< 0.01	2.41	-
Arsenic (As)	µg/l	3114 C	< 0.10	1.88	≤ 10
Chromium Trivalent (Cr ³⁺)	µg/l	3113 B / Calculation	< 1.00	ND	-
Chromium Hexavalent (Cr ⁶⁺)	µg/l	3113 B	< 1.00	ND	≤ 50
Mercury (Hg)	µg/l	3112 B	< 0.05	ND	≤ 0.1
Nickel (Ni)	µg/l	3113 B	< 5.00	ND	-
Vanadium (V)	µg/l	3120 B	< 10.00	ND	-

REFERENCE : STANDARD METHODS FOR EXAMINATION OF WATER AND WASTEWATER 21st ED. 2017 (AWWA, APHA, WEF)

REFERENCE : Intergovernmental Oceanographic Commission of UNESCO (IOC) 1981

(Miss Khemchuda Insorn)

Analyst

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WATER AND WASTEWATER ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No.	: 1597/67
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Integrate
SAMPLING DATE	: 08/08/2024	SAMPLING TIME	: 09:10
RECEIVED DATE	: 09/08/2024	ANALYTICAL DATE	: 08-16/08/2024
REPORT DATE	: 17/08/2024	SITE OPERATOR	: Mr. Chitpon Somprasong
SAMPLE CONDITION	: Normal	FILE CODE	: 224003_CW_August

PARAMETER	UNITS	ANALYSIS METHODS	ND (non-detectable)	SATATION	STANDARD ^{1/}
				Wastewater Discharge Point of Refinery (IEAT)	
Depth	m.	Measurement	-	1.7	-
Temperature	°C	2550 B	< 0.5	31.4	$\Delta \leq 2$
Transparency	m.	Secchi Disc	-	0.8	$\Delta \leq 10 \%$
pH	-	4500-H ⁺ B	< 0.10	8.00	7.0-8.5
Fat Oil & Grease	mg/l	5520 B	< 0.50	ND	-
Fat Oil & Grease	-	Visual Testing	-	NV	NV
Suspended Solid (SS)	mg/l	2540 D	2.5	21.32	^{2/}
Ammonia Nitrogen	µg/l	4500-NH ₃ F	< 10.0	87.7	-
Phenols	mg/l	5530 B-C	< 0.001	ND	≤ 0.03
Dissolved Oxygen	mg/l	4500-O G	< 0.10	5.94	≥ 4
BOD ₅	mg/l	5210 B	< 1.0	1.8	-
Salinity	ppt	2520 B	< 0.10	21.9	$\Delta \leq 10 \%$
Chromium Trivalent (Cr ³⁺)	µg/l	3113 B / Calculation	< 1.00	ND	-
Chromium Hexavalent (Cr ⁶⁺)	µg/l	3113 B	< 1.00	ND	≤ 50
Mercury (Hg)	µg/l	3112 B	< 0.05	ND	≤ 0.1

REFERENCE : STANDARD METHODS FOR EXAMINATION OF WATER AND WASTEWATER 21st ED. 2017 (AWWA, APHA, WEF)

REFERENCE : Intergovernmental Oceanographic Commission of UNESCO (IOC).1981



(Miss Khemchuda Insorn)

Analyst



(Mrs. Araya Tipparuk)

Technical Management Team

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4. - Not available .



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WATER AND WASTEWATER ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No.	: 2620/67
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Integrate
SAMPLING DATE	: 13/12/2024	SAMPLING TIME	: 10:14
RECEIVED DATE	: 14/12/2024	ANALYTICAL DATE	: 14-25/12/2024
REPORT DATE	: 27/12/2024	SITE OPERATOR	: Mr. Baworn Deechaiya
SAMPLE CONDITION	: Normal	FILE CODE	: 224003_CW_December

PARAMETER	UNITS	ANALYSIS METHODS	ND (non-detectable)	SATATION	STANDARD ^{1/}
				Wastewater Discharge Point of Refinery (IEAT)	
Depth	m.	Measurement	-	3.0	-
Temperature	°C	2550 B	< 0.5	28.9	$\Delta \leq 2$
Transparency	m.	Secchi Disc	-	2.0	$\Delta \leq 10 \%$
pH	-	4500-H ⁺ B	< 0.10	8.20	7.0-8.5
Fat Oil & Grease	mg/l	5520 B	< 0.50	ND	-
Fat Oil & Grease	-	Visual Testing	-	NV	NV
Suspended Solid (SS)	mg/l	2540 D	2.5	21.00	2/
Ammonia Nitrogen	µg/l	4500-NH ₃ F	< 10.0	34.9	-
Phenols	mg/l	5530 B-C	< 0.001	ND	≤ 0.03
Dissolved Oxygen	mg/l	4500-O G	< 0.10	5.6	≥ 4
BOD ₅	mg/l	5210 B	< 1.0	2.3	-
Salinity	ppt	2520 B	< 0.10	28.6	$\Delta \leq 10 \%$
Chromium Trivalent (Cr ³⁺)	µg/l	3113 B / Calculation	< 1.00	ND	-
Chromium Hexavalent (Cr ⁶⁺)	µg/l	3113 B	< 1.00	ND	≤ 50
Mercury (Hg)	µg/l	3112 B	< 0.05	ND	≤ 0.1

REFERENCE : STANDARD METHODS FOR EXAMINATION OF WATER AND WASTEWATER 23rd ED. 2017 (AWWA, APHA, WEF)

REFERENCE : Intergovernmental Oceanographic Commission of UNESCO (IOC), 1981



(Miss Khemchuda Insorn)

Analyst



(Mrs. Araya Tipparuk)

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4. - Not available .



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WATER AND WASTEWATER ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No.	: 1597/67
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Integrate
SAMPLING DATE	: 08/08/2024	SAMPLING TIME	: 09:34
RECEIVED DATE	: 09/08/2024	ANALYTICAL DATE	: 08-16/08/2024
REPORT DATE	: 17/08/2024	SITE OPERATOR	: Mr. Chitpon Somprasong
SAMPLE CONDITION	: Normal	FILE CODE	: 224003_CW_August

PARAMETER	UNITS	ANALYSIS METHODS	ND (non-detectable)	SATATION	STANDARD ^{1/}
				Open Coastal Water	
Depth	m.	Measurement	-	3.8	-
Temperature	°C	2550 B	< 0.5	30.4	$\Delta \leq 2$
Transparency	m.	Secchi Disc	< 0.10	1.5	$\Delta \leq 10 \%$
pH	-	4500-H ⁺ B	-	8.04	7.0-8.5
Fat Oil & Grease	mg/l	5520 B	< 0.50	ND	-
Fat Oil & Grease	-	Visual Testing	-	NV	NV
Suspended Solid (SS)	mg/l	2540 D	2.5	9.04	^{2/}
Ammonia Nitrogen	µg/l	4500-NH ₃ F	< 10.0	17.0	-
Phenols	mg/l	5530 B-C	< 0.001	ND	≤ 0.03
Dissolved Oxygen	mg/l	4500-O G	< 0.10	4.90	≥ 4
BOD ₅	mg/l	5210 B	< 1.0	< 1.0	-
Salinity	ppt	2520 B	< 0.10	22.9	$\Delta \leq 10 \%$
Total Petroleum Hydrocarbon	µg/l	IOC/GGE(MSI)-III/3	< 0.10	ND	≤ 5
TOC [*]	mg/l	5310 B	< 0.01	1.98	-
Chromium Trivalent (Cr ³⁺)	µg/l	3113 B / Calculation	< 1.00	ND	-
Chromium Hexavalent (Cr ⁶⁺)	µg/l	3113 B	< 1.00	ND	≤ 50
Mercury (Hg)	µg/l	3112 B	< 0.05	ND	≤ 0.1

REFERENCE : STANDARD METHODS FOR EXAMINATION OF WATER AND WASTEWATER 21st ED, 2017 (AWWA, APHA, WEF)

REFERENCE : Intergovernmental Oceanographic Commission of UNESCO (IOC), 1981



(Miss Khemchuda Insorn)

Analyst



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4. *TOC analysis was performed by The Office of Public Health and Environmental Technology Services, Faculty of Public Health, Mahidol University.

5. - Not available.



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WATER AND WASTEWATER ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No.	: 2620/67
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Integrate
SAMPLING DATE	: 13/12/2024	SAMPLING TIME	: 09:43
RECEIVED DATE	: 14/12/2024	ANALYTICAL DATE	: 14-25/12/2024
REPORT DATE	: 27/12/2024	SITE OPERATOR	: Mr. Baworn Deechaiya
SAMPLE CONDITION	: Normal	FILE CODE	: 224003_CW_December

PARAMETER	UNITS	ANALYSIS METHODS	ND (non-detectable)	SATATION	STANDARD ^{1/}
				Open Coastal Water	
Depth	m.	Measurement	-	6.1	-
Temperature	°C	2550 B	< 0.5	28.8	$\Delta \leq 2$
Transparency	m.	Secchi Disc	< 0.10	2.5	$\Delta \leq 10 \%$
pH	-	4500-H ⁺ B	-	8.26	7.0-8.5
Fat Oil & Grease	mg/l	5520 B	< 0.50	ND	-
Fat Oil & Grease	-	Visual Testing	-	NV	NV
Suspended Solid (SS)	mg/l	2540 D	2.5	5.60	^{2/}
Ammonia Nitrogen	µg/l	4500-NH ₃ F	< 10.0	ND	-
Phenols	mg/l	5530 B-C	< 0.001	ND	≤ 0.03
Dissolved Oxygen	mg/l	4500-O G	< 0.10	4.50	≥ 4
BOD ₅	mg/l	5210 B	< 1.0	1.3	-
Salinity	ppt	2520 B	< 0.10	32.6	$\Delta \leq 10 \%$
Total Petroleum Hydrocarbon	µg/l	IOC/GGE(MSI)-III/3	< 0.10	0.52	≤ 5
TOC [*]	mg/l	5310 B	< 0.01	2.27	-
Arsenic (As)	µg/l	3114 C	< 0.10	1.06	≤ 10
Chromium Trivalent (Cr ³⁺)	µg/l	3113 B / Calculation	< 1.00	ND	-
Chromium Hexavalent (Cr ⁶⁺)	µg/l	3113 B	< 1.00	ND	≤ 50
Mercury (Hg)	µg/l	3112 B	< 0.05	ND	≤ 0.1
Nickel (Ni)	µg/l	3113 B	< 5.00	ND	-
Vanadium (V)	µg/l	3120 B	< 10.00	ND	-

REFERENCE : STANDARD METHODS FOR EXAMINATION OF WATER AND WASTEWATER 23rd ED., 2017 (AWWA, APHA, WEF)

REFERENCE : Intergovernmental Oceanographic Commission of UNESCO (IOC), 1981



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WATER AND WASTEWATER ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No. :	1609/67
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Integrate
SAMPLING DATE	: 08/08/2024	SAMPLING TIME	: 09:24-13:24
RECEIVED DATE	: 09/08/2024	ANALYTICAL DATE	: 13-14/08/2024
REPORT DATE	: 17/08/2024	SITE OPERATOR	: Mr. Chitpon Somprasong
SAMPLE CONDITION	: Normal	FILE CODE	: 224003_CW_August

PARAMETER	UNITS	ANALYSIS METHODS	ND (non-detectable)	SAMPLING TIME	Ko Saket	STANDARD (Avg.+SD.)
					RESULT	
Suspended Solid (SS)	mg/l	2540 D	< 2.5	09:24	9.88	10.25
				10:24	8.20	
				11:24	6.86	
				12:24	7.44	
				13:24	10.72	
				Average	8.62	
				SD.	1.63	

REFERENCE : STANDARD METHODS FOR EXAMINATION OF WATER AND WASTEWATER 21st ED. 2017 (AWWA, APHA, WEF)

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(Mrs. Araya Tipparuk)

Technical Management Team

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239 RIMKLONGPRAPA ROAD, BANGSUE, BANGKOK 10800, THAILAND

TEL. (662) 959-3600 FAX (662) 959-3535 Website : secot.co.th E-mail : envserv@secot.co.th

WATER AND WASTEWATER ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No. :	1609/67
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Integrate
SAMPLING DATE	: 08/08/2024	SAMPLING TIME	: 09:34-13:34
RECEIVED DATE	: 09/08/2024	ANALYTICAL DATE	: 13-14/08/2024
REPORT DATE	: 17/08/2024	SITE OPERATOR	: Mr. Chitpon Somprasong
SAMPLE CONDITION	: Normal	FILE CODE	: 224003_CW_August

PARAMETER	UNITS	ANALYSIS METHODS	ND (non-detectable)	SAMPLING TIME	Open Coastal Water	STANDARD (Avg.+SD.)
					RESULT	
Suspended Solid (SS)	mg/l	2540 D	< 2.5	09:34	8.28	9.12
				10:34	7.36	
				11:34	5.28	
				12:34	9.40	
				13:34	7.72	
				Average	7.61	
				SD.	1.51	

REFERENCE : STANDARD METHODS FOR EXAMINATION OF WATER AND WASTEWATER 23RD ED. 2017 (AWWA, APHA, WEF)

(Miss Khemchuda Insorn)

Analyst

(Mrs. Araya Tipparuk)

Technical Management Team

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WATER AND WASTEWATER ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No. :	1609/67
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Integrate
SAMPLING DATE	: 08/08/2024	SAMPLING TIME	: 09:10-13:10
RECEIVED DATE	: 09/08/2024	ANALYTICAL DATE	: 13-14/08/2024
REPORT DATE	: 17/08/2024	SITE OPERATOR	: Mr. Chitpon Somprasong
SAMPLE CONDITION	: Normal	FILE CODE	: 224003_CW_August

PARAMETER	UNITS	ANALYSIS METHODS	ND (non-detectable)	SAMPLING TIME	Wastewater Discharge Point of Refinery (IEAT)	STANDARD (Avg.+SD.)
					RESULT	
Suspended Solid (SS)	mg/l	2540 D	< 2.5	09:10	20.60	22.24
				10:10	17.92	
				11:10	21.68	
				12:10	18.24	
				13:10	22.52	
				Average	20.19	
				SD.	2.05	

REFERENCE : STANDARD METHODS FOR EXAMINATION OF WATER AND WASTEWATER 23rd ED. 2017 (AWWA, APHA, WEF)

(Miss Khemchuda Insorn)

Analyst

(Mrs. Araya Tipparuk)

Technical Management Team

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WATER AND WASTEWATER ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No.	: 1609/67
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Integrate
SAMPLING DATE	: 08/08/2024	SAMPLING TIME	: 09:44-13:44
RECEIVED DATE	: 09/08/2024	ANALYTICAL DATE	: 13-14/08/2024
REPORT DATE	: 17/08/2024	SITE OPERATOR	: Mr. Chitpon Somprasong
SAMPLE CONDITION	: Normal	FILE CODE	: 224003_CW_August

PARAMETER	UNITS	ANALYSIS METHODS	ND (non-defectable)	SAMPLING TIME	In front of Had Sai Thong Beach RESULT	STANDARD (Avg.+SD.)
Suspended Solid (SS)	mg/l	2540 D	< 2.5	09:44	7.56	10.37
				10:44	9.72	
				11:44	7.88	
				12:44	5.89	
				13:44	10.94	
				Average	8.40	
				SD.	1.97	

REFERENCE : STANDARD METHODS FOR EXAMINATION OF WATER AND WASTEWATER 21st ED. 2017 (AWWA, APHA, WEF)



(Miss Khemchuda Insorn)

Analyst



(Mrs. Araya Tipparuk)

Technical Management Team

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ใบรับรองผลการตรวจวัดระดับเสียง



Noise Monitoring Result : Community Noise

MTR-SPRC PLC-Refinery

Location : Main Office Complex

Monitor Period : 01-08 Nov 2024

SLM Model : Cirrus CR161B

Serial No : G302630

Site Operator : Mr. Siwanon Kulawong

Calibrator Model : Cirrus CR:515

Serial No : 94296

Calibration Ref dB(A) : 94.0

Certified Date : 14 Feb 2024

SLM Reading / Adjust dB(A) : 93.7/0.0

Expire Date : 13 Feb 2025

Cal Sheet No.: CR-515-2024-312

Time	Equivalent Sound Pressure Level (dBA)						
	01-02 Nov 24	02-03 Nov 24	03-04 Nov 24	04-05 Nov 24	05-06 Nov 24	06-07 Nov 24	07-08 Nov 24
16:00 - 17:00	52.9	55.1	60.4	58.8	60.1	58.2	56.1
17:00 - 18:00	53.3	57.0	61.3	58.1	67.4	57.9	56.9
18:00 - 19:00	56.1	56.8	59.7	57.6	58.6	57.7	56.4
19:00 - 20:00	55.1	55.7	59.5	56.5	56.7	59.2	55.1
20:00 - 21:00	54.4	55.1	60.2	54.0	56.4	60.4	54.5
21:00 - 22:00	52.9	53.0	56.2	52.4	51.8	62.4	53.4
22:00 - 23:00	53.7	51.8	54.2	50.9	54.3	58.4	50.3
23:00 - 00:00	50.4	51.0	51.8	51.7	54.1	57.0	53.6
00:00 - 01:00	48.7	50.0	49.4	49.4	49.3	48.7	51.2
01:00 - 02:00	47.6	48.5	50.6	47.3	49.5	47.3	49.7
02:00 - 03:00	46.7	48.7	47.7	48.0	46.7	47.0	48.7
03:00 - 04:00	47.0	47.8	47.6	47.2	47.2	46.8	50.3
04:00 - 05:00	47.9	47.6	48.6	47.5	48.7	48.5	49.9
05:00 - 06:00	50.8	50.1	51.0	52.1	50.9	51.1	51.6
06:00 - 07:00	56.7	55.3	56.9	59.5	56.4	56.4	57.8
07:00 - 08:00	58.2	55.4	58.9	62.6	58.9	58.7	57.8
08:00 - 09:00	56.5	54.0	56.9	57.9	56.7	56.2	55.2
09:00 - 10:00	54.1	53.6	53.5	55.4	54.2	54.1	54.2
10:00 - 11:00	53.3	53.6	53.5	53.8	54.7	54.0	53.6
11:00 - 12:00	54.8	54.5	54.0	53.9	56.5	53.9	54.5
12:00 - 13:00	55.1	56.5	53.7	53.5	58.4	55.1	53.9
13:00 - 14:00	53.7	56.0	54.3	54.4	58.9	55.4	54.1
14:00 - 15:00	53.5	57.1	52.4	53.7	59.2	54.4	53.9
15:00 - 16:00	54.4	58.6	61.4	53.8	58.6	54.6	54.6
Leq(24)*	53.8	54.5	56.7	55.6	58.0	56.5	54.3
Ldn	58.4	58.4	60.0	59.9	60.7	60.9	59.4
Lmax **	76.8	75.8	81.1	74.3	78.5	78.3	77.3
Standard-24Hr	70 dBA						
Standard-Max	115 dBA						

Remark : * Average time between 16:00-16:00

** Maximum Sound Pressure Level between 16:00-16:00

(Miss Katesarin Vorradetwittaya)
Environmental Scientist

(Miss Preeda Somjai)
Technical Management Team



Noise Monitoring Result : Background Noise

MTR-SPRC PLC-Refinery

Location : Main Office Complex

Monitor Period : 01-08 Nov 2024

SLM Model : Cirrus CR161B

Serial No : G302630

Site Operator : Mr. Siwanon Kulawong

Calibrator Model : Cirrus CR:515

Serial No : 94296

Calibration Ref dB(A) : 94.0

Certified Date : 14 Feb 2024

SLM Reading / Adjust dB(A) : 93.7/0.0

Expire Date : 13 Feb 2025

Cal Sheet No.: CR-515-2024-312

Time	L90 (dBA)						
	01-02 Nov 24	02-03 Nov 24	03-04 Nov 24	04-05 Nov 24	05-06 Nov 24	06-07 Nov 24	07-08 Nov 24
16:00 - 17:00	49.2	49.9	55.7	53.9	50.8	53.5	50.4
17:00 - 18:00	49.3	51.9	57.0	53.6	61.5	53.8	52.4
18:00 - 19:00	51.5	52.8	55.2	53.8	54.6	52.7	52.5
19:00 - 20:00	50.1	50.9	54.6	52.6	52.5	54.6	50.1
20:00 - 21:00	48.5	49.1	54.5	49.0	50.5	55.9	48.4
21:00 - 22:00	47.6	47.5	50.1	46.9	47.1	57.2	47.1
22:00 - 23:00	47.1	46.1	46.3	45.9	47.2	53.2	45.3
23:00 - 00:00	46.4	45.0	45.1	47.6	50.0	49.6	46.5
00:00 - 01:00	44.5	45.1	45.4	45.3	45.5	44.5	46.8
01:00 - 02:00	44.6	44.2	45.2	44.0	45.8	44.3	46.0
02:00 - 03:00	44.0	44.8	45.0	43.3	44.6	43.7	45.7
03:00 - 04:00	44.0	44.6	44.6	43.5	44.8	44.0	45.4
04:00 - 05:00	44.7	44.3	44.5	44.0	45.5	44.9	46.1
05:00 - 06:00	45.8	45.0	45.6	44.5	46.2	46.0	47.0
06:00 - 07:00	51.7	50.5	51.8	55.2	51.6	51.7	52.6
07:00 - 08:00	53.3	50.4	54.7	58.0	54.6	54.3	53.6
08:00 - 09:00	51.4	48.9	51.5	53.3	51.8	51.1	50.1
09:00 - 10:00	49.2	48.2	48.4	50.7	49.6	50.2	49.1
10:00 - 11:00	48.6	47.9	48.5	49.2	48.7	49.8	48.6
11:00 - 12:00	49.1	48.6	48.6	48.7	51.6	48.9	49.2
12:00 - 13:00	48.0	50.6	48.4	47.8	54.0	50.4	48.7
13:00 - 14:00	47.9	50.0	48.6	49.3	54.1	50.7	49.1
14:00 - 15:00	48.7	51.3	49.4	50.1	54.1	49.0	50.2
15:00 - 16:00	49.3	53.3	50.4	49.3	53.4	49.4	51.3
L90(avg)*	48.8	49.2	51.4	51.1	52.6	51.7	49.5

Remark : * Average time between 16:00-16:00

(Miss Katesarin Vorradetwittaya)
Environmental Scientist

(Miss Preeda Somjai)
Technical Management Team



Noise Monitoring Result : Community Noise

MTR-SPRC PLC-Refinery

Location : Central Control Building

Monitor Period : 01-08 Nov 2024

SLM Model : Cirrus CR162B

Serial No : G302741

Site Operator : Mr. Siwanon Kulawong

Calibrator Model : Cirrus CR:515

Serial No : 94296

Calibration Ref dB(A) : 94.0

Certified Date : 14 Feb 2024

SLM Reading / Adjust dB(A) : 93.7/0.0

Expire Date : 13 Feb 2025

Cal Sheet No.: CR-515-2024-312

Time	Equivalent Sound Pressure Level (dBA)						
	01-02 Nov 24	02-03 Nov 24	03-04 Nov 24	04-05 Nov 24	05-06 Nov 24	06-07 Nov 24	07-08 Nov 24
16:00 - 17:00	65.1	65.7	65.3	64.9	66.1	65.1	64.7
17:00 - 18:00	66.0	66.1	65.8	65.6	65.8	65.6	65.1
18:00 - 19:00	65.6	65.6	65.6	65.4	65.7	65.5	65.4
19:00 - 20:00	65.3	65.6	65.4	65.0	65.3	65.2	65.2
20:00 - 21:00	65.5	65.6	65.2	65.0	65.6	65.4	65.1
21:00 - 22:00	65.6	65.5	65.3	64.6	65.6	65.4	65.1
22:00 - 23:00	65.8	65.4	65.3	64.8	65.7	65.4	65.4
23:00 - 00:00	66.1	65.6	65.6	65.0	65.8	65.3	66.2
00:00 - 01:00	65.8	65.6	65.4	64.5	65.9	64.6	64.9
01:00 - 02:00	65.9	65.4	65.2	64.3	66.0	64.4	64.9
02:00 - 03:00	65.7	65.3	65.1	64.5	65.6	64.6	64.9
03:00 - 04:00	65.6	65.1	65.1	64.6	65.5	64.4	65.1
04:00 - 05:00	65.6	65.2	65.3	64.7	65.6	65.1	65.1
05:00 - 06:00	65.8	65.4	65.5	65.1	65.6	65.2	65.3
06:00 - 07:00	65.4	65.2	65.3	65.0	65.3	64.7	65.3
07:00 - 08:00	68.3	67.9	66.2	67.7	67.2	69.1	65.5
08:00 - 09:00	65.2	65.0	65.2	66.4	65.3	65.8	64.8
09:00 - 10:00	65.0	64.9	65.1	66.3	65.2	66.7	64.7
10:00 - 11:00	64.9	64.8	64.9	67.0	65.3	66.7	64.7
11:00 - 12:00	64.6	64.9	64.8	67.5	65.0	66.6	64.6
12:00 - 13:00	65.0	65.1	64.7	67.0	65.3	66.2	64.9
13:00 - 14:00	65.2	65.4	64.6	66.9	71.8	66.8	65.5
14:00 - 15:00	65.4	65.5	64.7	66.9	64.8	65.1	65.2
15:00 - 16:00	65.7	65.6	64.9	67.3	65.1	64.6	64.6
Leq(24)*	65.6	65.5	65.2	65.8	66.1	65.7	65.1
Ldn	72.1	71.8	71.7	71.4	72.2	71.5	71.6
Lmax **	93.5	94.0	88.4	92.5	97.0	94.6	85.7
Standard-24Hr	70 dBA						
Standard-Max	115 dBA						

Remark : * Average time between 16:00-16:00

** Maximum Sound Pressure Level between 16:00-16:00

(Miss Katesarin Vorradetwittaya)
Environmental Scientist

(Miss Preeda Somjai)
Technical Management Team



Noise Monitoring Result : Background Noise

MTR-SPRC PLC-Refinery

Location : Central Control Building

Monitor Period : 01-08 Nov 2024

SLM Model : Cirrus CR162B

Serial No : G302741

Site Operator : Mr. Siwanon Kulawong

Calibrator Model : Cirrus CR:515

Serial No : 94296

Calibration Ref dB(A) : 94.0

Certified Date : 14 Feb 2024

SLM Reading / Adjust dB(A) : 93.7/0.0

Expire Date : 13 Feb 2025

Cal Sheet No.: CR-515-2024-312

Time	L90 (dBA)						
	01-02 Nov 24	02-03 Nov 24	03-04 Nov 24	04-05 Nov 24	05-06 Nov 24	06-07 Nov 24	07-08 Nov 24
16:00 - 17:00	64.5	65.4	64.9	64.5	65.1	64.8	64.2
17:00 - 18:00	65.3	65.6	64.9	64.8	65.0	64.9	64.2
18:00 - 19:00	65.2	65.1	65.1	65.1	65.1	64.8	64.5
19:00 - 20:00	65.0	65.3	65.1	64.6	64.9	64.9	64.6
20:00 - 21:00	65.3	65.3	64.9	64.8	65.4	65.0	64.5
21:00 - 22:00	65.4	65.1	65.0	64.3	65.4	64.9	64.7
22:00 - 23:00	65.5	65.1	65.0	64.5	65.4	64.9	64.7
23:00 - 00:00	65.5	65.1	65.2	64.7	65.5	64.8	64.9
00:00 - 01:00	65.5	65.2	65.1	64.2	65.5	64.1	64.5
01:00 - 02:00	65.6	65.1	64.9	64.0	65.7	63.9	64.4
02:00 - 03:00	65.4	65.0	64.8	64.3	65.4	64.2	64.4
03:00 - 04:00	65.2	64.8	64.9	64.3	65.3	64.0	64.5
04:00 - 05:00	65.3	64.9	65.0	64.3	65.3	64.3	64.5
05:00 - 06:00	65.4	65.1	65.2	64.8	65.3	64.5	64.6
06:00 - 07:00	65.0	64.9	65.0	64.5	65.0	64.3	64.6
07:00 - 08:00	64.9	64.7	64.7	64.7	65.0	64.4	64.4
08:00 - 09:00	64.7	64.6	64.6	65.5	64.7	64.6	64.1
09:00 - 10:00	64.5	64.5	64.5	65.6	64.7	65.7	64.1
10:00 - 11:00	64.4	64.4	64.5	65.9	64.7	65.9	64.0
11:00 - 12:00	64.1	64.4	64.4	66.5	64.6	65.5	63.9
12:00 - 13:00	64.6	64.7	64.3	66.1	64.8	65.7	64.3
13:00 - 14:00	64.8	64.9	64.0	66.2	64.6	65.5	64.9
14:00 - 15:00	65.0	65.1	64.4	66.1	64.4	64.1	64.3
15:00 - 16:00	65.3	65.3	64.4	66.3	64.7	64.1	64.1
L90(avg)*	65.1	65.0	64.8	65.1	65.1	64.8	64.4

Remark : * Average time between 16:00-16:00

(Miss Katesarin Vorradetwittaya)
Environmental Scientist

Preeda S.
(Miss Preeda Somjai)
Technical Management Team



Noise Monitoring Result : Community Noise

MTR-SPRC PLC-Refinery

Location : Northern Refinery Boundary Station 1

Monitor Period : 01-08 Nov 2024

SLM Model : Cirrus CR162B

Serial No : G300833

Site Operator : Mr. Siwanon Kulawong

Calibrator Model : Cirrus CR:515

Serial No : 94296

Calibration Ref dB(A) : 94.0

Certified Date : 14 Feb 2024

SLM Reading / Adjust dB(A) : 93.9/-0.2

Expire Date : 13 Feb 2025

Cal Sheet No.: CR-515-2024-312

Time	Equivalent Sound Pressure Level (dBA)						
	01-02 Nov 24	02-03 Nov 24	03-04 Nov 24	04-05 Nov 24	05-06 Nov 24	06-07 Nov 24	07-08 Nov 24
17:00 - 18:00	56.8	54.6	53.6	60.3	58.8	58.6	57.6
18:00 - 19:00	55.8	54.5	53.2	58.5	57.0	57.2	57.3
19:00 - 20:00	51.3	50.8	52.8	53.5	54.4	53.2	54.7
20:00 - 21:00	52.3	53.0	48.4	51.5	52.0	53.3	55.9
21:00 - 22:00	47.4	49.2	48.0	46.0	49.0	50.5	48.6
22:00 - 23:00	54.9	48.2	46.5	45.6	47.2	47.6	48.3
23:00 - 00:00	56.5	47.5	45.6	44.9	49.8	47.1	46.3
00:00 - 01:00	53.5	45.2	44.4	43.3	50.7	44.4	46.1
01:00 - 02:00	48.8	44.8	44.6	45.0	49.7	44.0	44.0
02:00 - 03:00	46.9	45.4	43.3	44.1	50.4	44.2	45.6
03:00 - 04:00	45.2	44.9	45.3	46.5	49.5	42.8	44.4
04:00 - 05:00	48.1	44.1	45.4	46.6	49.3	45.3	46.0
05:00 - 06:00	49.8	48.1	49.6	51.7	50.7	49.4	50.0
06:00 - 07:00	57.2	56.5	57.9	57.4	58.0	58.7	59.9
07:00 - 08:00	55.6	57.5	60.1	60.2	61.5	58.8	59.5
08:00 - 09:00	52.6	52.8	54.8	55.7	56.8	54.8	53.5
09:00 - 10:00	55.2	53.0	51.1	55.6	52.0	58.4	50.6
10:00 - 11:00	52.7	52.7	52.7	53.5	52.3	56.8	52.0
11:00 - 12:00	54.6	56.6	53.2	58.2	56.0	57.6	55.7
12:00 - 13:00	52.3	51.9	52.2	55.2	54.5	52.9	53.7
13:00 - 14:00	51.5	53.5	51.4	54.1	55.2	53.0	52.2
14:00 - 15:00	52.1	52.9	52.0	58.2	53.6	51.2	53.8
15:00 - 16:00	51.3	52.7	50.7	53.2	52.9	53.1	54.0
16:00 - 17:00	57.8	54.4	59.9	65.4	61.0	59.4	54.0
Leq(24)*	53.7	52.6	53.3	56.5	55.3	54.8	54.1
Ldn	59.6	56.8	57.5	59.0	59.3	58.5	58.8
Lmax **	88.8	88.8	87.4	91.1	88.9	90.6	89.0
Standard-24Hr	70 dBA						
Standard-Max	115 dBA						

Remark : * Average time between 17:00-17:00

** Maximum Sound Pressure Level between 17:00-17:00

(Miss Katesarin Vorradetwittaya)
Environmental Scientist

(Miss Preeda Somjai)
Technical Management Team



Noise Monitoring Result : Background Noise

MTR-SPRC PLC-Refinery

Location : Northern Refinery Boundary Station 1

Monitor Period : 01-08 Nov 2024

SLM Model : Cirrus CR162B

Serial No : G300833

Site Operator : Mr. Siwanon Kulawong

Calibrator Model : Cirrus CR:515

Serial No : 94296

Calibration Ref dB(A) : 94.0

Certified Date : 14 Feb 2024

SLM Reading / Adjust dB(A) : 93.9/-0.2


Expire Date : 13 Feb 2025

Cal Sheet No.: CR-515-2024-312

Time	L90 (dBA)						
	01-02 Nov 24	02-03 Nov 24	03-04 Nov 24	04-05 Nov 24	05-06 Nov 24	06-07 Nov 24	07-08 Nov 24
17:00 - 18:00	45.8	45.7	47.8	49.3	51.2	46.8	46.9
18:00 - 19:00	45.0	46.2	46.2	48.5	48.3	46.4	46.8
19:00 - 20:00	44.0	45.6	44.9	48.4	46.9	45.9	46.4
20:00 - 21:00	43.9	46.3	43.5	47.3	46.7	45.2	45.3
21:00 - 22:00	45.1	46.1	43.0	42.7	45.8	44.3	43.5
22:00 - 23:00	44.1	44.2	43.4	41.5	45.4	44.7	43.7
23:00 - 00:00	44.1	44.4	43.3	42.7	45.5	43.8	43.3
00:00 - 01:00	44.3	43.5	42.9	41.1	45.3	42.1	43.4
01:00 - 02:00	46.0	43.1	42.7	41.2	45.7	41.7	42.3
02:00 - 03:00	45.0	44.2	42.3	40.1	45.5	41.5	43.0
03:00 - 04:00	44.0	43.4	43.0	45.6	45.6	41.2	42.6
04:00 - 05:00	46.1	42.6	43.5	41.6	48.1	41.7	43.0
05:00 - 06:00	46.8	42.9	43.3	43.0	46.8	43.5	44.6
06:00 - 07:00	47.5	45.7	47.5	47.8	47.8	48.0	48.8
07:00 - 08:00	45.7	46.2	48.8	51.4	48.2	48.5	49.1
08:00 - 09:00	43.9	45.4	44.3	49.9	46.8	46.8	45.3
09:00 - 10:00	43.7	44.8	42.9	50.5	44.7	48.1	42.8
10:00 - 11:00	44.0	44.1	42.2	47.3	44.4	48.2	43.1
11:00 - 12:00	44.2	44.4	42.5	47.6	44.8	45.8	43.1
12:00 - 13:00	43.4	44.9	42.2	45.8	44.7	46.0	43.3
13:00 - 14:00	43.4	45.3	42.5	49.0	45.2	46.6	46.0
14:00 - 15:00	45.7	45.0	42.5	48.7	45.5	43.7	46.1
15:00 - 16:00	45.7	47.2	42.5	46.9	45.2	43.5	50.6
16:00 - 17:00	47.2	47.9	44.8	46.3	46.6	44.3	50.7
L90(avg)*	45.1	45.2	44.3	47.1	46.6	45.5	46.0

Remark : * Average time between 17:00-17:00


 (Miss Katesarin Vorradetwittaya)
 Environmental Scientist


 (Miss Preeda Somjai)
 Technical Management Team



Noise Monitoring Result : Community Noise

MTR-SPRC PLC-Refinery

Location : Northern Refinery Boundary Station 2

Monitor Period : 01-08 Nov 2024

SLM Model : Cirrus CR162B

Serial No : G302743

Site Operator : Mr. Siwanon Kulawong

Calibrator Model : Cirrus CR:515

Serial No : 94296

Calibration Ref dB(A) : 94.0

Certified Date : 14 Feb 2024

SLM Reading / Adjust dB(A) : 92.8/0.9

Expire Date : 13 Feb 2025

Cal Sheet No.: CR-515-2024-312

Time	Equivalent Sound Pressure Level (dBA)						
	01-02 Nov 24	02-03 Nov 24	03-04 Nov 24	04-05 Nov 24	05-06 Nov 24	06-07 Nov 24	07-08 Nov 24
17:00 - 18:00	54.2	55.0	53.2	57.1	65.2	58.7	57.0
18:00 - 19:00	54.9	52.7	53.9	60.6	59.3	57.0	55.2
19:00 - 20:00	54.8	53.7	53.5	58.4	56.6	55.3	56.9
20:00 - 21:00	53.0	52.5	52.2	55.9	55.4	53.1	55.6
21:00 - 22:00	53.2	54.1	54.4	55.8	55.3	54.9	54.9
22:00 - 23:00	52.8	53.1	51.1	53.8	54.6	55.2	52.9
23:00 - 00:00	53.5	51.5	52.2	52.8	54.3	54.0	52.3
00:00 - 01:00	53.2	51.3	52.6	54.8	53.7	54.1	52.4
01:00 - 02:00	54.4	51.4	51.3	53.1	53.8	52.1	52.2
02:00 - 03:00	53.5	52.2	52.1	51.9	55.4	51.0	51.3
03:00 - 04:00	53.8	52.6	51.8	52.0	54.4	51.3	51.6
04:00 - 05:00	53.0	52.2	52.8	51.5	53.3	51.0	51.6
05:00 - 06:00	53.0	51.0	53.0	51.4	53.7	52.4	52.2
06:00 - 07:00	54.3	52.2	54.5	53.6	54.4	53.9	53.9
07:00 - 08:00	56.6	53.3	57.8	58.6	57.5	58.1	58.1
08:00 - 09:00	55.7	53.0	55.8	59.2	57.8	57.5	56.6
09:00 - 10:00	54.9	52.4	56.7	56.5	66.9	54.5	53.6
10:00 - 11:00	56.8	51.5	55.9	55.6	54.2	57.3	52.8
11:00 - 12:00	52.2	51.2	53.4	54.6	54.5	55.0	53.0
12:00 - 13:00	53.7	51.1	54.0	55.4	55.4	54.3	54.1
13:00 - 14:00	53.3	51.0	53.9	56.0	54.8	53.9	54.5
14:00 - 15:00	53.4	53.4	54.2	57.0	54.3	54.8	54.6
15:00 - 16:00	53.7	53.4	54.4	56.9	54.4	54.3	57.0
16:00 - 17:00	53.7	54.4	54.3	56.7	54.2	55.7	57.6
Leq(24)*	54.1	52.7	54.0	56.1	58.2	55.1	54.7
Ldn	60.1	58.6	59.3	60.3	61.9	60.0	59.4
Lmax **	84.4	81.5	78.4	84.9	86.0	80.3	77.9
Standard-24Hr	70 dBA						
Standard-Max	115 dBA						

Remark : * Average time between 17:00-17:00

** Maximum Sound Pressure Level between 17:00-17:00

(Miss Katesarin Vorradetwittaya)
Environmental Scientist

(Miss Preeda Somjai)
Technical Management Team



Noise Monitoring Result : Background Noise

MTR-SPRC PLC-Refinery

Location : Northern Refinery Boundary Station 2

Monitor Period : 01-08 Nov 2024

SLM Model : Cirrus CR162B

Serial No : G302743

Site Operator : Mr. Siwanon Kulawong

Calibrator Model : Cirrus CR:515

Serial No : 94296

Calibration Ref dB(A) : 94.0

Certified Date : 14 Feb 2024

SLM Reading / Adjust dB(A) : 92.8/0.9

Expire Date : 13 Feb 2025

Cal Sheet No.: CR-515-2024-312

Time	L90 (dBA)						
	01-02 Nov 24	02-03 Nov 24	03-04 Nov 24	04-05 Nov 24	05-06 Nov 24	06-07 Nov 24	07-08 Nov 24
17:00 - 18:00	50.5	51.1	51.1	52.7	53.2	53.4	52.1
18:00 - 19:00	52.6	50.6	50.9	53.2	55.9	53.4	52.6
19:00 - 20:00	52.1	51.6	51.2	55.3	54.2	51.9	52.7
20:00 - 21:00	50.6	50.8	50.3	54.1	52.5	50.8	53.1
21:00 - 22:00	50.3	51.6	50.1	53.0	53.0	51.3	51.6
22:00 - 23:00	51.3	51.1	49.5	51.5	52.3	50.5	50.9
23:00 - 00:00	51.8	49.9	49.9	50.4	52.1	51.1	50.7
00:00 - 01:00	51.8	49.9	50.6	52.1	51.9	51.2	51.1
01:00 - 02:00	53.1	49.5	49.4	51.0	51.9	49.4	50.7
02:00 - 03:00	52.1	50.2	50.2	49.7	53.3	48.5	49.7
03:00 - 04:00	52.0	50.6	49.7	49.2	52.4	49.0	50.2
04:00 - 05:00	51.5	50.1	50.5	49.1	51.4	48.8	50.1
05:00 - 06:00	52.0	49.4	50.7	49.2	51.3	49.6	50.3
06:00 - 07:00	52.2	50.0	51.9	50.7	51.3	51.0	50.9
07:00 - 08:00	54.0	51.2	53.5	53.3	53.3	53.3	54.0
08:00 - 09:00	53.1	50.8	52.0	55.5	53.7	54.1	53.3
09:00 - 10:00	51.8	49.7	51.4	54.2	52.8	52.4	51.7
10:00 - 11:00	50.7	49.3	52.0	53.1	51.5	53.1	51.0
11:00 - 12:00	50.4	49.2	51.4	52.7	51.3	52.3	51.2
12:00 - 13:00	51.0	48.7	51.2	52.6	51.5	52.1	51.4
13:00 - 14:00	51.0	48.4	50.7	52.9	51.2	51.8	50.7
14:00 - 15:00	51.2	48.9	51.1	54.6	51.5	52.7	51.3
15:00 - 16:00	51.8	50.5	50.6	54.5	51.4	51.7	53.8
16:00 - 17:00	51.3	50.8	51.4	52.8	51.3	51.2	53.8
L90(avg)*	51.8	50.3	51.0	52.8	52.5	51.7	51.8

Remark : * Average time between 17:00-17:00

(Miss Katesarin Vorradetwittaya)
Environmental Scientist

(Miss Preeda Somjai)
Technical Management Team



Noise Monitoring Result : Community Noise

MTR-SPRC PLC-Refinery

Location : Northern Refinery Boundary Station 3

Monitor Period : 01-08 Nov 2024

SLM Model : Cirrus CR162B

Serial No : G300769

Site Operator : Mr. Siwanon Kulawong

Calibrator Model : Cirrus CR:515

Serial No : 94296

Calibration Ref dB(A) : 94.0

Certified Date : 14 Feb 2024

SLM Reading / Adjust dB(A) : 94.1/-0.4

Expire Date : 13 Feb 2025

Cal Sheet No.: CR-515-2024-312

Time	Equivalent Sound Pressure Level (dBA)						
	01-02 Nov 24	02-03 Nov 24	03-04 Nov 24	04-05 Nov 24	05-06 Nov 24	06-07 Nov 24	07-08 Nov 24
16:00 - 17:00	57.1	56.7	57.7	56.4	58.2	57.8	56.0
17:00 - 18:00	57.4	56.4	57.3	58.6	58.5	57.4	55.0
18:00 - 19:00	59.3	56.4	57.3	60.2	58.9	59.3	57.5
19:00 - 20:00	57.4	55.3	55.7	60.8	60.4	57.0	57.2
20:00 - 21:00	58.4	58.5	55.0	63.1	67.8	57.0	56.0
21:00 - 22:00	64.3	66.8	56.5	65.0	70.7	57.9	56.2
22:00 - 23:00	61.4	68.9	61.1	67.9	67.0	59.4	62.6
23:00 - 00:00	58.2	68.4	61.2	65.6	63.5	60.3	65.3
00:00 - 01:00	58.3	69.4	58.3	62.1	58.5	58.5	64.9
01:00 - 02:00	60.7	70.2	56.7	62.0	60.6	57.0	65.0
02:00 - 03:00	58.8	64.7	55.9	62.2	58.6	58.8	68.5
03:00 - 04:00	57.8	55.7	56.7	62.5	57.1	56.5	62.1
04:00 - 05:00	56.8	54.3	56.0	59.9	57.2	56.9	55.8
05:00 - 06:00	57.2	55.9	55.8	56.9	56.8	56.9	55.8
06:00 - 07:00	57.8	56.0	56.5	57.4	57.0	57.1	57.3
07:00 - 08:00	56.6	55.9	56.5	60.3	56.9	57.2	57.1
08:00 - 09:00	54.6	54.9	54.2	59.9	54.7	57.2	55.0
09:00 - 10:00	53.6	53.8	53.0	60.0	54.1	59.3	53.7
10:00 - 11:00	55.4	52.5	53.6	58.3	53.5	59.2	55.1
11:00 - 12:00	52.4	53.0	53.7	59.4	54.5	58.6	54.5
12:00 - 13:00	52.5	52.8	53.2	59.8	54.6	60.2	54.2
13:00 - 14:00	53.4	53.1	53.5	61.0	55.3	60.5	56.0
14:00 - 15:00	56.8	55.1	57.3	61.4	54.9	56.2	57.3
15:00 - 16:00	56.0	57.0	55.7	60.0	55.0	53.9	57.9
Leq(24)*	58.1	63.0	56.7	61.8	61.7	58.2	60.6
Ldn	65.1	72.1	64.2	69.3	67.7	64.5	69.6
Lmax **	84.4	82.1	81.3	80.9	74.7	82.6	83.3
Standard-24Hr	70 dBA						
Standard-Max	115 dBA						

Remark : * Average time between 16:00-16:00

** Maximum Sound Pressure Level between 16:00-16:00

(Miss Katesarin Vorradetwittaya)
Environmental Scientist

Preeda S.
(Miss Preeda Somjai)
Technical Management Team



Noise Monitoring Result : Background Noise

MTR-SPRC PLC-Refinery

Location : Northern Refinery Boundary Station 3

Monitor Period : 01-08 Nov 2024

SLM Model : Cirrus CR162B

Serial No : G300769

Site Operator : Mr. Siwanon Kulawong

Calibrator Model : Cirrus CR:515

Serial No : 94296

Calibration Ref dB(A) : 94.0

Certified Date : 14 Feb 2024

SLM Reading / Adjust dB(A) : 94.1/-0.4

Expire Date : 13 Feb 2025

Cal Sheet No.: CR-515-2024-312

Time	L90 (dBA)						
	01-02 Nov 24	02-03 Nov 24	03-04 Nov 24	04-05 Nov 24	05-06 Nov 24	06-07 Nov 24	07-08 Nov 24
16:00 - 17:00	54.5	54.4	55.3	53.1	53.5	54.2	51.6
17:00 - 18:00	55.6	53.3	54.8	54.5	56.5	55.3	52.0
18:00 - 19:00	56.8	54.2	55.2	58.3	56.7	57.3	55.4
19:00 - 20:00	54.7	53.2	53.5	59.0	56.2	54.6	55.2
20:00 - 21:00	54.9	53.5	52.9	58.7	61.4	54.9	53.3
21:00 - 22:00	60.6	61.0	52.9	58.9	69.1	55.0	53.1
22:00 - 23:00	55.8	63.7	53.9	64.0	62.5	55.5	53.8
23:00 - 00:00	55.5	62.6	57.0	58.6	58.0	56.2	56.0
00:00 - 01:00	55.8	63.0	53.6	55.2	55.1	53.7	55.4
01:00 - 02:00	56.3	59.5	53.9	53.4	56.8	53.3	55.1
02:00 - 03:00	56.0	54.3	53.8	54.0	55.6	53.8	53.9
03:00 - 04:00	56.2	53.4	53.8	53.5	54.9	53.2	53.3
04:00 - 05:00	55.6	52.1	53.8	53.4	55.1	54.4	52.9
05:00 - 06:00	56.1	52.6	53.9	54.9	54.6	54.5	53.0
06:00 - 07:00	56.1	53.6	54.6	55.0	54.7	54.7	55.1
07:00 - 08:00	54.3	53.2	53.9	57.7	54.1	54.4	54.1
08:00 - 09:00	51.3	52.1	51.3	57.3	51.9	53.8	52.1
09:00 - 10:00	50.0	51.1	50.3	56.4	50.5	55.4	50.9
10:00 - 11:00	50.1	49.8	50.7	55.1	50.7	55.5	50.3
11:00 - 12:00	49.1	49.8	50.4	55.1	51.9	54.8	50.2
12:00 - 13:00	49.5	49.7	50.3	55.6	51.9	56.1	50.1
13:00 - 14:00	50.5	50.0	50.6	57.7	52.4	56.2	52.3
14:00 - 15:00	53.1	51.8	51.5	58.5	52.1	51.0	54.5
15:00 - 16:00	53.9	55.0	51.8	55.0	52.5	50.8	54.7
L90(avg)*	55.1	57.0	53.4	57.3	58.6	54.7	53.6

Remark : * Average time between 16:00-16:00

(Miss Katesarin Vorradetwittaya)
Environmental Scientist

(Miss Preeda Somjai)
Technical Management Team



Noise Monitoring Result : Community Noise

MTR-SPRC PLC-Refinery

Location : Eastern Refinery Boundary
SLM Model : Cirrus CR162B
Site Operator : Mr. Siwanon Kulawong

Monitor Period : 01-08 Nov 2024
Serial No : G302742

Calibrator Model : Cirrus CR:515
Calibration Ref dB(A) : 94.0
SLM Reading / Adjust dB(A) : 93.7/0.0
Cal Sheet No.: CR-515-2024-312

Serial No : 94296
Certified Date : 14 Feb 2024
Expire Date : 13 Feb 2025

Time	Equivalent Sound Pressure Level (dBA)						
	01-02 Nov 24	02-03 Nov 24	03-04 Nov 24	04-05 Nov 24	05-06 Nov 24	06-07 Nov 24	07-08 Nov 24
16:00 - 17:00	64.9	64.0	64.5	62.6	66.0	64.9	64.2
17:00 - 18:00	65.8	65.3	65.3	65.9	66.7	65.4	65.8
18:00 - 19:00	65.7	64.7	63.4	64.4	66.7	65.0	64.0
19:00 - 20:00	64.2	64.4	63.8	64.2	65.3	65.0	65.8
20:00 - 21:00	64.3	63.7	63.3	64.9	62.0	63.8	62.9
21:00 - 22:00	61.7	63.4	59.9	59.3	60.5	61.6	61.0
22:00 - 23:00	63.6	60.6	60.4	59.8	62.5	61.5	60.2
23:00 - 00:00	57.6	61.6	57.9	56.7	61.2	56.3	58.6
00:00 - 01:00	57.6	63.1	57.9	56.2	59.9	58.1	60.8
01:00 - 02:00	56.7	61.5	58.5	53.1	59.7	53.1	57.9
02:00 - 03:00	54.5	61.8	54.5	61.2	52.7	54.8	56.8
03:00 - 04:00	57.2	55.3	54.8	54.2	53.9	53.2	59.7
04:00 - 05:00	55.3	55.8	55.1	56.3	56.1	55.4	55.3
05:00 - 06:00	60.9	57.2	59.2	58.2	58.5	58.6	57.6
06:00 - 07:00	65.2	63.8	65.4	64.5	66.5	65.6	65.0
07:00 - 08:00	65.8	65.0	66.9	66.6	67.7	67.3	66.3
08:00 - 09:00	62.6	62.1	62.1	63.8	64.1	62.4	62.8
09:00 - 10:00	61.2	63.4	60.2	62.5	61.2	61.5	61.4
10:00 - 11:00	60.0	60.5	61.0	61.7	61.6	61.9	60.2
11:00 - 12:00	63.3	62.5	61.2	61.7	62.3	61.3	62.1
12:00 - 13:00	62.1	61.4	60.9	60.8	61.1	61.4	61.9
13:00 - 14:00	61.2	59.4	61.2	62.3	60.6	61.2	60.6
14:00 - 15:00	61.5	60.6	61.0	62.3	62.8	60.1	59.0
15:00 - 16:00	61.2	61.9	61.4	60.5	63.4	60.4	59.4
Leq(24)*	62.5	62.4	61.9	62.2	63.2	62.3	62.2
Ldn	67.3	67.8	66.7	66.5	67.9	66.7	67.0
Lmax **	91.1	93.5	89.2	94.7	94.4	90.9	92.2
Standard-24Hr	70 dBA						
Standard-Max	115 dBA						

Remark : * Average time between 16:00-16:00

** Maximum Sound Pressure Level between 16:00-16:00

(Miss Katesarin Vorradetwittaya)
Environmental Scientist

Preeda S.
(Miss Preeda Somjai)
Technical Management Team



Noise Monitoring Result : Background Noise

MTR-SPRC PLC-Refinery

Location : Eastern Refinery Boundary
SLM Model : Cirrus CR162B
Site Operator : Mr. Siwanon Kulawong

Monitor Period : 01-08 Nov 2024
Serial No : G302742


Calibrator Model : Cirrus CR:515
Calibration Ref dB(A) : 94.0
SLM Reading / Adjust dB(A) : 93.7/0.0
Cal Sheet No.: CR-515-2024-312

Serial No : 94296
Certified Date : 14 Feb 2024
Expire Date : 13 Feb 2025

Time	L90 (dBA)						
	01-02 Nov 24	02-03 Nov 24	03-04 Nov 24	04-05 Nov 24	05-06 Nov 24	06-07 Nov 24	07-08 Nov 24
16:00 - 17:00	56.5	52.4	52.9	54.0	55.3	55.1	54.3
17:00 - 18:00	56.7	55.9	55.0	58.5	59.6	57.3	57.2
18:00 - 19:00	55.2	55.7	53.1	56.8	56.7	56.5	56.1
19:00 - 20:00	53.0	52.6	52.0	53.1	54.4	53.4	53.6
20:00 - 21:00	50.4	51.6	49.1	50.1	51.6	50.9	51.3
21:00 - 22:00	49.2	49.2	47.7	47.7	49.5	48.5	48.0
22:00 - 23:00	48.1	47.9	47.4	46.4	48.9	48.8	47.0
23:00 - 00:00	47.9	47.7	46.9	46.2	49.0	47.8	46.5
00:00 - 01:00	47.4	47.4	46.8	46.4	48.9	46.8	46.6
01:00 - 02:00	48.5	47.1	46.5	46.2	48.2	45.2	45.8
02:00 - 03:00	47.4	46.9	46.4	45.9	47.9	45.5	46.0
03:00 - 04:00	47.7	46.6	46.1	46.3	47.5	45.8	46.3
04:00 - 05:00	48.8	47.0	46.6	46.9	47.7	46.6	47.0
05:00 - 06:00	50.1	47.4	48.2	47.3	48.9	48.7	48.3
06:00 - 07:00	55.8	53.8	55.7	56.0	55.5	55.7	55.9
07:00 - 08:00	56.2	53.7	58.1	59.7	59.3	58.4	58.6
08:00 - 09:00	52.6	51.0	52.3	55.5	53.9	52.7	52.2
09:00 - 10:00	51.4	50.1	50.3	53.5	52.3	53.1	49.6
10:00 - 11:00	50.2	49.9	50.5	52.2	51.7	52.7	48.9
11:00 - 12:00	51.1	50.1	49.2	51.6	50.8	50.2	50.3
12:00 - 13:00	49.0	49.5	49.5	49.9	49.8	51.1	51.0
13:00 - 14:00	48.4	47.4	49.5	50.8	51.0	50.5	50.1
14:00 - 15:00	49.8	47.4	51.0	52.8	52.0	50.9	51.5
15:00 - 16:00	49.6	49.9	50.3	50.5	51.3	49.9	53.8
L90(avg)*	52.1	50.9	51.4	53.1	53.3	52.6	52.4

Remark : * Average time between 16:00-16:00


(Miss Katesarin Vorradetwittaya)
Environmental Scientist


(Miss Preeda Somjai)
Technical Management Team



Noise Monitoring Result : Community Noise

MTR-SPRC PLC-Refinery

Location : Southern Refinery Boundary Station 1

Monitor Period : 01-08 Nov 2024

SLM Model : Cirrus CR162B

Serial No : G300990

Site Operator : Mr. Siwanon Kulawong

Calibrator Model : Cirrus CR:515

Serial No : 94296

Calibration Ref dB(A) : 94.0

Certified Date : 14 Feb 2024

SLM Reading / Adjust dB(A) : 93.8/-0.1

Expire Date : 13 Feb 2025

Cal Sheet No.: CR-515-2024-312

Time	Equivalent Sound Pressure Level (dBA)						
	01-02 Nov 24	02-03 Nov 24	03-04 Nov 24	04-05 Nov 24	05-06 Nov 24	06-07 Nov 24	07-08 Nov 24
16:00 - 17:00	62.2	58.9	57.2	53.1	59.6	61.1	59.4
17:00 - 18:00	60.3	61.3	58.8	55.4	61.9	63.1	61.9
18:00 - 19:00	61.2	61.7	58.5	57.9	61.5	61.1	62.4
19:00 - 20:00	62.0	60.8	56.1	61.2	59.9	62.1	62.6
20:00 - 21:00	62.2	60.3	54.7	61.8	60.9	62.7	63.2
21:00 - 22:00	60.9	56.5	53.6	59.9	59.6	60.2	62.4
22:00 - 23:00	59.2	51.0	47.5	55.9	56.1	59.3	57.9
23:00 - 00:00	57.2	47.5	46.5	53.6	53.3	58.3	57.3
00:00 - 01:00	54.1	45.1	46.3	53.0	52.3	60.0	56.3
01:00 - 02:00	51.4	48.0	54.0	55.6	58.0	56.7	56.5
02:00 - 03:00	49.1	48.2	53.1	52.9	56.1	55.2	54.2
03:00 - 04:00	47.2	46.9	52.1	51.7	55.4	55.6	54.0
04:00 - 05:00	46.6	46.5	51.8	52.4	55.5	58.1	55.2
05:00 - 06:00	46.0	47.8	51.7	52.7	55.5	56.0	57.6
06:00 - 07:00	48.2	48.1	53.5	53.3	55.8	57.6	56.8
07:00 - 08:00	52.0	50.7	57.1	57.4	59.6	58.9	59.8
08:00 - 09:00	53.0	52.4	57.3	58.3	60.8	60.6	60.6
09:00 - 10:00	52.9	54.7	49.8	57.6	59.8	61.0	60.9
10:00 - 11:00	53.7	54.5	51.1	57.4	58.7	59.8	59.1
11:00 - 12:00	54.3	54.0	52.2	57.4	58.8	59.1	58.3
12:00 - 13:00	56.2	52.3	52.6	58.6	60.2	60.4	59.2
13:00 - 14:00	55.5	52.6	52.1	57.8	59.2	58.5	57.8
14:00 - 15:00	55.7	52.6	51.9	58.2	59.5	59.1	57.4
15:00 - 16:00	57.8	54.9	53.8	58.7	59.6	59.6	56.2
Leq(24)*	57.5	55.7	54.3	57.2	58.9	59.8	59.4
Ldn	61.2	57.6	58.7	61.2	63.0	64.7	63.7
Lmax **	75.7	82.4	77.6	75.6	75.5	80.6	84.4
Standard-24Hr	70 dBA						
Standard-Max	115 dBA						

Remark : * Average time between 16:00-16:00

** Maximum Sound Pressure Level between 16:00-16:00

(Miss Katesarin Vorradetwittaya)
Environmental Scientist

Preeda S.
(Miss Preeda Somjai)
Technical Management Team



Noise Monitoring Result : Background Noise

MTR-SPRC PLC-Refinery

Location : Southern Refinery Boundary Station 1

Monitor Period : 01-08 Nov 2024

SLM Model : Cirrus CR162B

Serial No : G300990

Site Operator : Mr. Siwanon Kulawong

Calibrator Model : Cirrus CR:515

Serial No : 94296

Calibration Ref dB(A) : 94.0

Certified Date : 14 Feb 2024

SLM Reading / Adjust dB(A) : 93.8/-0.1

Expire Date : 13 Feb 2025

Cal Sheet No.: CR-515-2024-312

Time	L90 (dBA)						
	01-02 Nov 24	02-03 Nov 24	03-04 Nov 24	04-05 Nov 24	05-06 Nov 24	06-07 Nov 24	07-08 Nov 24
16:00 - 17:00	58.8	51.2	49.3	49.8	55.3	55.8	54.7
17:00 - 18:00	55.4	55.3	52.3	51.7	57.7	57.6	57.5
18:00 - 19:00	57.2	55.7	50.1	50.7	58.5	56.7	57.6
19:00 - 20:00	58.7	55.1	50.5	58.3	57.3	57.9	58.1
20:00 - 21:00	58.5	52.6	48.0	57.6	57.7	57.7	57.3
21:00 - 22:00	57.6	49.3	47.5	56.0	56.2	55.7	54.9
22:00 - 23:00	55.3	44.9	42.9	52.6	52.8	56.1	52.1
23:00 - 00:00	53.4	41.4	43.2	51.1	50.4	56.2	52.1
00:00 - 01:00	51.0	40.3	42.4	50.6	50.3	55.7	52.7
01:00 - 02:00	47.6	44.0	48.9	51.9	55.6	54.1	51.7
02:00 - 03:00	47.4	47.2	51.8	51.7	55.2	53.5	52.0
03:00 - 04:00	46.0	45.7	51.1	50.6	54.5	54.2	52.1
04:00 - 05:00	45.2	45.6	50.9	51.0	54.5	55.0	52.9
05:00 - 06:00	44.6	46.6	50.8	51.5	54.5	54.2	52.2
06:00 - 07:00	45.9	46.6	51.8	51.1	54.3	54.8	54.2
07:00 - 08:00	49.5	48.6	55.0	55.4	57.3	56.9	56.1
08:00 - 09:00	50.0	50.1	46.4	56.3	59.0	57.4	57.5
09:00 - 10:00	49.6	52.4	46.0	55.4	57.6	56.7	56.0
10:00 - 11:00	50.4	51.6	45.8	55.5	56.8	56.3	54.1
11:00 - 12:00	51.0	47.1	47.1	55.2	56.6	55.2	54.2
12:00 - 13:00	52.3	44.5	46.9	55.6	57.6	55.8	54.8
13:00 - 14:00	51.3	45.2	46.8	54.5	56.5	53.4	53.9
14:00 - 15:00	51.2	46.1	47.0	55.2	57.0	54.5	52.4
15:00 - 16:00	48.5	47.7	49.7	54.3	54.7	54.3	51.3
L90(avg)*	53.7	50.1	49.5	54.2	56.2	55.9	54.8

Remark : * Average time between 16:00-16:00

(Miss Katesarin Vorradetwittaya)
Environmental Scientist

(Miss Preeda Somjai)
Technical Management Team



Noise Monitoring Result : Community Noise

MTR-SPRC PLC-Refinery

Location : Southern Refinery Boundary Station 2

Monitor Period : 01-08 Nov 2024

SLM Model : Cirrus CR161B

Serial No : G303385

Site Operator : Mr. Siwanon Kulawong

Calibrator Model : Cirrus CR:515

Serial No : 94296

Calibration Ref dB(A) : 94.0

Certified Date : 14 Feb 2024

SLM Reading / Adjust dB(A) : 93.7/0.0

Expire Date : 13 Feb 2025

Cal Sheet No.: CR-515-2024-312

Time	Equivalent Sound Pressure Level (dBA)						
	01-02 Nov 24	02-03 Nov 24	03-04 Nov 24	04-05 Nov 24	05-06 Nov 24	06-07 Nov 24	07-08 Nov 24
15:00 - 16:00	62.8	61.2	61.2	61.6	61.8	62.6	61.9
16:00 - 17:00	64.5	63.5	63.0	63.9	65.0	63.8	63.4
17:00 - 18:00	64.8	64.1	62.9	63.0	61.1	60.5	62.1
18:00 - 19:00	63.8	63.9	61.5	63.2	60.8	63.9	63.0
19:00 - 20:00	63.6	63.2	61.3	64.5	62.5	63.6	63.1
20:00 - 21:00	62.4	61.8	60.5	64.2	62.6	62.1	62.3
21:00 - 22:00	59.4	59.4	58.1	62.1	60.7	60.3	59.2
22:00 - 23:00	58.5	59.4	58.7	61.5	59.3	59.8	58.8
23:00 - 00:00	58.6	58.5	58.0	61.1	61.0	59.4	58.3
00:00 - 01:00	58.0	59.1	58.2	60.1	60.7	58.8	58.4
01:00 - 02:00	57.3	58.1	57.4	56.9	59.4	57.5	57.7
02:00 - 03:00	56.9	57.8	57.3	56.5	59.2	58.5	57.6
03:00 - 04:00	57.6	57.7	57.2	58.5	58.7	66.7	58.2
04:00 - 05:00	57.4	58.0	57.6	59.4	58.5	59.1	58.3
05:00 - 06:00	59.1	58.4	59.0	58.7	58.7	59.5	59.0
06:00 - 07:00	62.6	61.6	62.5	63.0	62.4	62.8	62.5
07:00 - 08:00	64.4	62.8	63.8	64.1	63.7	64.2	63.4
08:00 - 09:00	62.2	61.6	62.7	62.9	62.5	62.6	62.4
09:00 - 10:00	60.4	60.9	60.7	61.8	60.7	61.4	60.5
10:00 - 11:00	60.4	59.4	60.6	61.2	60.8	60.8	60.2
11:00 - 12:00	61.7	60.1	63.1	61.9	63.1	62.1	62.0
12:00 - 13:00	60.4	58.7	60.3	61.1	61.3	61.4	60.6
13:00 - 14:00	60.3	58.4	60.2	62.3	62.0	61.8	61.5
14:00 - 15:00	60.8	59.4	60.7	61.9	63.6	61.8	60.0
Leq(24)*	61.4	60.8	60.7	61.9	61.6	62.0	61.0
Ldn	66.0	65.8	65.7	66.9	66.8	67.9	66.0
Lmax **	84.0	84.8	82.3	82.5	87.6	82.5	83.2
Standard-24Hr	70 dBA						
Standard-Max	115 dBA						

Remark : * Average time between 15:00-15:00

** Maximum Sound Pressure Level between 15:00-15:00

(Miss Katesarin Vorradetwittaya)
Environmental Scientist

(Miss Preeda Somjai)
Technical Management Team



Noise Monitoring Result : Background Noise

MTR-SPRC PLC-Refinery

Location : Southern Refinery Boundary Station 2

Monitor Period : 01-08 Nov 2024

SLM Model : Cirrus CR161B

Serial No : G303385

Site Operator : Mr. Siwanon Kulawong

Calibrator Model : Cirrus CR:515

Serial No : 94296

Calibration Ref dB(A) : 94.0

Certified Date : 14 Feb 2024

SLM Reading / Adjust dB(A) : 93.7/0.0

Expire Date : 13 Feb 2025

Cal Sheet No.: CR-515-2024-312

Time	L90 (dBA)						
	01-02 Nov 24	02-03 Nov 24	03-04 Nov 24	04-05 Nov 24	05-06 Nov 24	06-07 Nov 24	07-08 Nov 24
15:00 - 16:00	58.2	55.8	55.2	57.0	57.1	57.6	56.5
16:00 - 17:00	60.5	57.7	57.2	59.1	60.5	58.9	59.0
17:00 - 18:00	60.8	58.5	56.0	58.1	58.5	57.6	57.5
18:00 - 19:00	59.9	58.8	56.8	59.7	58.4	60.3	59.3
19:00 - 20:00	59.1	58.5	57.0	59.4	59.4	58.9	58.3
20:00 - 21:00	57.3	57.3	56.1	59.2	59.0	57.8	57.4
21:00 - 22:00	56.1	56.2	55.8	59.0	57.8	57.1	55.9
22:00 - 23:00	55.9	56.1	56.6	58.7	56.9	57.2	55.7
23:00 - 00:00	56.0	56.3	56.4	59.4	59.3	56.5	55.6
00:00 - 01:00	55.3	56.3	55.9	55.7	58.5	55.6	55.3
01:00 - 02:00	55.8	56.7	55.5	55.3	58.0	55.1	55.5
02:00 - 03:00	55.5	56.3	55.5	54.8	57.6	55.8	55.5
03:00 - 04:00	55.9	56.3	55.9	55.6	57.3	60.9	56.1
04:00 - 05:00	55.7	56.7	56.3	57.7	56.9	56.8	55.6
05:00 - 06:00	56.5	56.7	57.0	55.6	56.7	57.3	56.5
06:00 - 07:00	59.7	58.5	59.4	59.8	59.1	59.8	59.1
07:00 - 08:00	60.3	59.0	60.4	61.6	60.5	60.9	60.5
08:00 - 09:00	58.0	57.6	58.3	60.0	58.8	58.5	58.1
09:00 - 10:00	56.9	56.7	56.2	59.1	56.7	57.3	56.0
10:00 - 11:00	56.7	56.0	55.7	57.7	56.6	56.5	55.6
11:00 - 12:00	57.3	56.0	56.3	57.3	58.2	57.1	57.0
12:00 - 13:00	55.3	54.9	55.6	55.8	56.8	56.0	55.9
13:00 - 14:00	55.5	55.2	55.8	56.7	57.0	56.4	55.4
14:00 - 15:00	54.1	54.1	55.8	57.0	57.7	55.7	53.4
L90(avg)*	57.6	56.9	56.7	58.2	58.2	57.9	57.0

Remark : * Average time between 15:00-15:00

(Miss Katesarin Vorradetwittaya)
Environmental Scientist

(Miss Preeda Somjai)
Technical Management Team



Noise Monitoring Result : Community Noise

MTR-SPRC PLC-Refinery

Location : Map Ta Phut New Town

Monitor Period : 01-08 Nov 2024

SLM Model : Cirrus CR161B

Serial No : G303827

Site Operator : Mr. Siwanon Kulawong

Calibrator Model : Cirrus CR:515

Serial No : 94296

Calibration Ref dB(A) : 94.0

Certified Date : 14 Feb 2024

SLM Reading / Adjust dB(A) : 93.7/0.0

Expire Date : 13 Feb 2025

Cal Sheet No.: CR-515-2024-312

Time	Equivalent Sound Pressure Level (dBA)						
	01-02 Nov 24	02-03 Nov 24	03-04 Nov 24	04-05 Nov 24	05-06 Nov 24	06-07 Nov 24	07-08 Nov 24
17:00 - 18:00	51.4	50.0	60.0	71.2	57.3	52.6	51.9
18:00 - 19:00	50.1	50.1	58.4	61.5	54.9	52.0	51.9
19:00 - 20:00	49.3	48.9	58.0	51.8	50.8	52.8	50.6
20:00 - 21:00	51.8	50.2	61.6	58.8	50.1	57.5	48.0
21:00 - 22:00	49.7	49.7	57.7	50.0	46.8	45.7	51.8
22:00 - 23:00	53.0	53.5	56.9	46.7	47.0	49.8	48.5
23:00 - 00:00	48.0	47.8	59.0	52.2	47.1	57.1	44.1
00:00 - 01:00	48.6	44.7	45.0	46.9	45.2	46.0	43.5
01:00 - 02:00	48.0	42.8	45.0	45.0	54.6	44.9	42.1
02:00 - 03:00	47.5	43.2	43.4	45.3	45.6	45.0	42.5
03:00 - 04:00	47.1	43.8	43.9	43.7	44.2	45.0	42.2
04:00 - 05:00	48.9	44.4	44.0	43.5	47.7	44.7	45.3
05:00 - 06:00	50.2	45.7	46.1	49.6	47.1	46.1	45.0
06:00 - 07:00	55.4	50.5	49.9	56.7	52.7	50.3	51.1
07:00 - 08:00	52.9	48.7	53.5	60.2	53.8	49.5	53.7
08:00 - 09:00	51.1	49.2	52.5	54.5	54.9	48.9	53.9
09:00 - 10:00	50.6	48.4	49.9	49.9	49.6	48.7	50.8
10:00 - 11:00	50.8	52.8	48.1	48.6	49.1	49.3	49.2
11:00 - 12:00	49.9	53.1	48.9	49.4	50.3	49.1	51.2
12:00 - 13:00	49.0	55.3	51.2	49.3	50.1	50.8	53.0
13:00 - 14:00	50.7	56.2	50.9	49.5	50.4	52.2	50.7
14:00 - 15:00	50.8	57.4	48.5	51.1	48.6	53.6	48.9
15:00 - 16:00	49.0	58.5	49.2	49.6	51.5	50.0	50.7
16:00 - 17:00	48.4	59.4	51.6	68.5	51.2	51.8	51.9
Leq(24)*	50.6	52.8	54.7	60.3	51.4	51.3	50.2
Ldn	57.0	56.0	59.4	61.5	56.3	56.8	53.8
Lmax **	84.7	83.7	87.1	89.6	80.2	79.0	79.6
Standard-24Hr	70 dBA						
Standard-Max	115 dBA						

Remark : * Average time between 17:00-17:00

** Maximum Sound Pressure Level between 17:00-17:00

(Miss Katesarin Vorradetwittaya)
Environmental Scientist

Preeda S.
(Miss Preeda Somjai)
Technical Management Team



Noise Monitoring Result : Background Noise

MTR-SPRC PLC-Refinery

Location : Map Ta Phut New Town

Monitor Period : 01-08 Nov 2024

SLM Model : Cirrus CR161B

Serial No : G303827

Site Operator : Mr. Siwanon Kulawong

Calibrator Model : Cirrus CR:515

Serial No : 94296

Calibration Ref dB(A) : 94.0

Certified Date : 14 Feb 2024

SLM Reading / Adjust dB(A) : 93.7/0.0

Expire Date : 13 Feb 2025

Cal Sheet No.: CR-515-2024-312

Time	L90 (dBA)						
	01-02 Nov 24	02-03 Nov 24	03-04 Nov 24	04-05 Nov 24	05-06 Nov 24	06-07 Nov 24	07-08 Nov 24
17:00 - 18:00	46.0	45.9	57.1	46.5	49.8	45.2	45.5
18:00 - 19:00	45.9	45.9	56.0	53.3	48.9	45.6	47.2
19:00 - 20:00	45.5	46.3	55.7	49.6	47.2	46.3	47.8
20:00 - 21:00	44.7	47.6	57.8	47.5	46.7	44.9	45.0
21:00 - 22:00	44.5	47.0	50.0	45.0	44.9	43.4	42.7
22:00 - 23:00	44.5	46.0	43.2	42.1	44.2	43.4	42.3
23:00 - 00:00	43.6	45.4	42.0	46.6	44.0	50.0	41.5
00:00 - 01:00	45.6	41.5	41.0	43.0	43.1	44.0	40.6
01:00 - 02:00	45.3	40.4	42.2	40.9	43.1	43.3	39.8
02:00 - 03:00	44.7	41.8	40.8	39.8	42.8	43.5	39.9
03:00 - 04:00	43.6	41.3	41.1	39.9	42.0	42.6	39.5
04:00 - 05:00	44.5	40.7	42.4	40.0	41.3	42.9	39.8
05:00 - 06:00	45.0	41.4	42.2	40.3	41.8	43.5	40.6
06:00 - 07:00	47.4	44.9	45.5	52.8	45.9	46.8	45.5
07:00 - 08:00	46.1	45.1	47.7	53.5	49.0	46.2	47.8
08:00 - 09:00	45.8	45.2	47.1	48.7	48.1	46.1	47.2
09:00 - 10:00	46.5	44.6	44.5	46.3	44.3	46.2	44.9
10:00 - 11:00	46.5	43.9	44.0	43.8	44.4	45.8	44.8
11:00 - 12:00	46.6	44.0	44.1	43.1	44.7	45.8	44.9
12:00 - 13:00	44.2	47.7	45.7	43.2	45.1	47.3	44.8
13:00 - 14:00	45.8	49.0	46.5	45.5	45.3	48.1	45.4
14:00 - 15:00	46.8	52.7	45.3	45.0	43.9	50.3	43.7
15:00 - 16:00	45.2	54.6	44.7	45.2	45.3	46.0	44.2
16:00 - 17:00	45.4	56.5	45.4	45.6	46.4	46.7	44.2
L90(avg)*	45.5	48.3	50.2	47.4	45.7	46.1	44.5

Remark : * Average time between 17:00-17:00

(Miss Katesarin Vorradetwittaya)
Environmental Scientist

(Miss Preeda Somjai)
Technical Management Team



Noise Monitoring Result : Community Noise

MTR-SPRC PLC-Refinery

Location : Soi Ruam Patana Community

Monitor Period : 01-08 Nov 2024

SLM Model : Cirrus CR162B

Serial No : G302333

Site Operator : Mr. Siwanon Kulawong

Calibrator Model : Cirrus CR:515

Serial No : 94296

Calibration Ref dB(A) : 94.0

Certified Date : 14 Feb 2024

SLM Reading / Adjust dB(A) : 93.3/0.4

Expire Date : 13 Feb 2025

Cal Sheet No.: CR-515-2024-312

Time	Equivalent Sound Pressure Level (dBA)						
	01-02 Nov 24	02-03 Nov 24	03-04 Nov 24	04-05 Nov 24	05-06 Nov 24	06-07 Nov 24	07-08 Nov 24
17:00 - 18:00	58.9	62.6	57.2	61.0	60.0	64.4	61.5
18:00 - 19:00	58.1	56.1	58.7	59.6	59.3	57.8	60.2
19:00 - 20:00	57.3	60.8	59.8	56.5	56.1	58.7	56.9
20:00 - 21:00	56.6	63.3	56.7	59.3	56.2	57.2	56.9
21:00 - 22:00	56.8	55.9	53.5	53.3	55.0	54.8	56.4
22:00 - 23:00	51.6	55.0	50.1	51.4	52.1	49.8	51.2
23:00 - 00:00	47.8	48.8	49.8	50.5	54.2	48.5	47.6
00:00 - 01:00	46.6	49.9	50.7	48.9	47.4	46.3	50.1
01:00 - 02:00	44.7	45.6	46.6	47.4	48.7	45.9	44.9
02:00 - 03:00	46.9	44.3	44.9	48.3	46.4	45.7	46.9
03:00 - 04:00	43.1	42.9	49.4	44.5	44.1	44.8	42.4
04:00 - 05:00	44.7	44.9	48.1	46.6	44.6	45.5	49.1
05:00 - 06:00	48.5	50.1	52.0	51.2	50.5	53.6	53.6
06:00 - 07:00	61.4	59.2	61.1	64.0	58.5	60.1	60.6
07:00 - 08:00	56.9	59.7	60.3	59.2	61.6	57.6	64.1
08:00 - 09:00	54.0	55.5	56.8	57.6	55.6	56.9	55.8
09:00 - 10:00	54.5	54.7	52.8	55.3	56.6	57.7	51.7
10:00 - 11:00	54.8	58.2	53.3	54.7	53.9	56.9	56.9
11:00 - 12:00	53.9	54.4	55.3	56.8	56.7	55.4	53.4
12:00 - 13:00	55.2	59.6	58.6	57.8	58.2	57.1	58.5
13:00 - 14:00	56.5	54.3	55.3	57.7	54.7	53.2	50.2
14:00 - 15:00	52.9	58.3	55.0	54.8	57.7	55.1	52.9
15:00 - 16:00	56.5	54.7	58.1	55.6	55.9	54.3	59.4
16:00 - 17:00	56.5	60.2	56.3	62.0	58.4	60.0	48.4
Leq(24)*	55.3	57.4	56.0	57.3	56.2	56.7	56.8
Ldn	60.1	60.5	60.6	62.4	59.9	60.3	60.7
Lmax **	90.5	97.6	91.6	96.0	90.9	98.6	96.6
Standard-24Hr	70 dBA						
Standard-Max	115 dBA						

Remark : * Average time between 17:00-17:00

** Maximum Sound Pressure Level between 17:00-17:00

(Miss Katesarin Vorradetwittaya)
Environmental Scientist

Preeda S.
(Miss Preeda Somjai)
Technical Management Team



Noise Monitoring Result : Background Noise

MTR-SPRC PLC-Refinery

Location : Soi Ruam Patana Community

Monitor Period : 01-08 Nov 2024

SLM Model : Cirrus CR162B

Serial No : G302333

Site Operator : Mr. Siwanon Kulawong

Calibrator Model : Cirrus CR:515

Serial No : 94296

Calibration Ref dB(A) : 94.0

Certified Date : 14 Feb 2024

SLM Reading / Adjust dB(A) : 93.3/0.4

Expire Date : 13 Feb 2025

Cal Sheet No.: CR-515-2024-312

Time	L90 (dBA)						
	01-02 Nov 24	02-03 Nov 24	03-04 Nov 24	04-05 Nov 24	05-06 Nov 24	06-07 Nov 24	07-08 Nov 24
17:00 - 18:00	46.7	45.3	45.6	47.2	47.4	47.3	46.7
18:00 - 19:00	48.7	49.3	48.5	49.9	49.2	49.8	48.5
19:00 - 20:00	49.3	50.3	51.2	49.1	49.7	50.5	49.0
20:00 - 21:00	48.3	52.4	50.1	48.6	49.4	52.2	49.6
21:00 - 22:00	50.4	50.0	49.1	47.1	48.7	47.8	46.9
22:00 - 23:00	46.2	47.2	45.6	45.3	45.2	45.8	45.0
23:00 - 00:00	43.4	45.4	44.7	45.3	44.0	43.6	42.4
00:00 - 01:00	42.7	43.6	44.2	44.5	43.8	42.0	43.3
01:00 - 02:00	42.5	43.0	43.7	42.6	43.6	40.4	41.2
02:00 - 03:00	43.9	41.3	41.1	40.9	41.1	40.3	40.8
03:00 - 04:00	40.4	40.9	40.9	40.6	40.3	40.9	40.2
04:00 - 05:00	41.3	40.5	41.7	40.6	40.2	41.1	40.2
05:00 - 06:00	41.3	41.3	41.9	40.9	41.7	41.8	41.2
06:00 - 07:00	46.2	44.9	45.5	45.1	46.3	46.9	46.2
07:00 - 08:00	45.4	45.5	53.0	48.3	48.2	48.0	48.0
08:00 - 09:00	43.5	44.4	45.6	45.6	45.2	46.1	44.5
09:00 - 10:00	44.0	44.6	41.9	44.2	42.5	44.1	41.8
10:00 - 11:00	42.5	42.4	43.0	41.3	43.2	41.5	40.5
11:00 - 12:00	42.8	41.9	41.1	40.6	41.9	42.2	40.5
12:00 - 13:00	40.6	43.6	41.5	40.1	42.6	42.4	41.5
13:00 - 14:00	40.2	41.7	41.8	41.2	44.3	43.1	38.1
14:00 - 15:00	39.2	40.9	44.0	43.6	43.1	43.6	37.5
15:00 - 16:00	40.1	41.4	40.9	43.4	43.3	42.8	39.9
16:00 - 17:00	42.2	42.5	43.1	46.3	44.7	44.0	45.6
L90(avg)*	45.0	45.8	46.2	45.3	45.5	45.9	44.7

Remark : * Average time between 17:00-17:00

(Miss Katesarin Vorradetwittaya)
Environmental Scientist

(Miss Preeda Somjai)
Technical Management Team



Noise Monitoring Result : Community Noise

MTR-SPRC PLC-Refinery

Location : Wat Sophon Community

Monitor Period : 01-08 Nov 2024

SLM Model : Cirrus CR162B

Serial No : G302740

Site Operator : Mr. Siwanon Kulawong

Calibrator Model : Cirrus CR:515

Serial No : 94296

Calibration Ref dB(A) : 94.0

Certified Date : 14 Feb 2024

SLM Reading / Adjust dB(A) : 94.0/-0.3

Expire Date : 13 Feb 2025

Cal Sheet No.: CR-515-2024-312

Time	Equivalent Sound Pressure Level (dBA)						
	01-02 Nov 24	02-03 Nov 24	03-04 Nov 24	04-05 Nov 24	05-06 Nov 24	06-07 Nov 24	07-08 Nov 24
17:00 - 18:00	55.0	52.3	53.9	67.8	59.0	52.8	53.2
18:00 - 19:00	54.4	52.1	51.2	61.4	54.5	53.6	52.8
19:00 - 20:00	55.6	54.5	52.0	55.6	54.6	53.3	52.4
20:00 - 21:00	53.7	51.5	50.4	53.5	54.4	51.9	51.8
21:00 - 22:00	52.3	52.1	49.6	51.1	51.7	50.5	49.7
22:00 - 23:00	54.4	48.9	49.3	50.9	51.5	50.8	51.9
23:00 - 00:00	50.8	50.0	48.1	53.1	51.0	54.8	49.5
00:00 - 01:00	49.7	50.7	48.2	50.2	51.0	50.9	48.6
01:00 - 02:00	49.2	48.7	51.2	49.0	50.1	49.3	47.4
02:00 - 03:00	49.6	46.9	46.3	52.4	49.4	48.9	50.5
03:00 - 04:00	50.1	51.3	46.6	52.6	52.2	49.2	49.4
04:00 - 05:00	49.5	44.9	46.6	52.4	49.5	48.7	47.9
05:00 - 06:00	53.0	49.4	46.6	55.0	57.2	51.1	48.5
06:00 - 07:00	54.4	52.1	46.6	56.8	56.0	55.8	51.6
07:00 - 08:00	55.4	51.9	46.6	58.4	55.0	53.6	52.3
08:00 - 09:00	51.1	49.5	46.6	54.7	53.9	54.5	52.0
09:00 - 10:00	49.9	49.1	46.6	52.3	57.3	52.2	48.9
10:00 - 11:00	49.5	48.9	46.6	50.0	56.3	49.9	51.6
11:00 - 12:00	52.8	49.2	46.6	49.9	51.4	50.2	51.4
12:00 - 13:00	50.0	48.6	46.6	49.8	50.3	52.2	52.2
13:00 - 14:00	51.2	49.1	46.6	50.4	57.1	52.9	53.1
14:00 - 15:00	49.7	50.7	46.6	52.3	51.4	52.1	56.1
15:00 - 16:00	52.3	50.5	49.5	49.4	49.4	50.0	52.2
16:00 - 17:00	51.4	52.9	52.8	69.8	54.4	52.6	56.7
Leq(24)*	52.4	50.7	49.1	59.5	54.2	52.2	52.0
Ldn	58.3	56.3	54.7	62.0	59.7	58.3	56.8
Lmax **	83.2	81.2	79.6	81.8	91.0	79.6	94.7
Standard-24Hr	70 dBA						
Standard-Max	115 dBA						

Remark : * Average time between 17:00-17:00

** Maximum Sound Pressure Level between 17:00-17:00

(Miss Katesarin Vorradetwittaya)
Environmental Scientist

Preeda S.
(Miss Preeda Somjai)
Technical Management Team



Noise Monitoring Result : Background Noise

MTR-SPRC PLC-Refinery

Location : Wat Sophon Community

Monitor Period : 01-08 Nov 2024

SLM Model : Cirrus CR162B

Serial No : G302740

Site Operator : Mr. Siwanon Kulawong

Calibrator Model : Cirrus CR:515

Serial No : 94296

Calibration Ref dB(A) : 94.0

Certified Date : 14 Feb 2024

SLM Reading / Adjust dB(A) : 94.0/-0.3


Expire Date : 13 Feb 2025

Cal Sheet No.: CR-515-2024-312

Time	L90 (dBA)						
	01-02 Nov 24	02-03 Nov 24	03-04 Nov 24	04-05 Nov 24	05-06 Nov 24	06-07 Nov 24	07-08 Nov 24
17:00 - 18:00	50.9	47.5	49.1	50.9	53.5	49.6	48.9
18:00 - 19:00	50.7	47.2	48.1	56.6	51.6	50.0	49.1
19:00 - 20:00	49.7	47.9	48.4	52.0	50.7	49.5	48.0
20:00 - 21:00	48.4	46.3	46.8	50.2	50.0	48.2	46.8
21:00 - 22:00	48.0	45.8	46.7	48.7	48.9	46.9	45.9
22:00 - 23:00	47.4	44.8	46.3	48.1	48.4	46.7	45.9
23:00 - 00:00	46.4	43.7	46.0	49.2	48.1	49.9	45.9
00:00 - 01:00	46.9	43.3	45.7	47.6	47.8	46.9	45.4
01:00 - 02:00	45.9	42.3	45.4	47.2	48.1	45.7	44.9
02:00 - 03:00	46.8	41.8	45.2	47.2	48.3	46.0	44.3
03:00 - 04:00	45.9	41.8	45.3	47.4	48.2	45.8	44.1
04:00 - 05:00	45.8	41.9	45.3	47.2	47.8	46.0	44.6
05:00 - 06:00	46.5	42.4	45.3	48.5	47.8	46.8	45.3
06:00 - 07:00	50.5	46.6	45.3	53.7	51.0	50.3	48.7
07:00 - 08:00	49.7	46.7	45.3	53.0	51.9	50.7	49.5
08:00 - 09:00	47.2	45.4	45.3	51.1	48.7	49.1	48.5
09:00 - 10:00	45.7	45.1	45.3	49.5	48.7	47.0	46.5
10:00 - 11:00	45.6	45.2	45.3	47.7	47.2	46.8	47.3
11:00 - 12:00	46.1	44.5	45.3	47.1	47.0	47.6	48.8
12:00 - 13:00	45.4	44.6	45.3	46.8	46.6	48.4	48.8
13:00 - 14:00	44.5	45.5	45.3	47.2	47.5	49.3	48.9
14:00 - 15:00	45.3	46.8	45.3	47.8	46.3	47.6	48.0
15:00 - 16:00	46.0	47.0	46.4	46.4	46.2	46.7	48.0
16:00 - 17:00	46.9	48.3	48.3	47.8	47.5	47.6	51.0
L90(avg)*	47.6	45.5	46.3	50.1	49.1	48.2	47.6

Remark : * Average time between 17:00-17:00


 (Miss Katesarin Vorradetwittaya)
 Environmental Scientist


 (Miss Preeda Somjai)
 Technical Management Team

ใบรับรองผลการตรวจวัดทรัพยากรทางน้ำ



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

รายงานผลการวิเคราะห์แพลงก์ตอนพืชและแพลงก์ตอนสัตว์
ตาราง ผลการวิเคราะห์แพลงก์ตอนพืชและแพลงก์ตอนสัตว์ (เก็บตัวอย่างวันที่ 8 สิงหาคม 2567)

กลุ่ม/สกุลของแพลงก์ตอน	ปริมาณแพลงก์ตอน (หน่วยต่อลูกบาศก์เมตร)			
	S1	S2	S3	S4
แพลงก์ตอนพืช				
Division Cyanophyta				
Class Cyanophyceae				
Order Nostocales				
Family Oscillatoriaceae				
<i>Lyngbya</i> sp.	-	-	91,000	-
<i>Oscillatoria</i> sp.	10,000	20,000	100,000	107,000
<i>Oscillatoria tenuis</i>	366,000	707,000	190,000	192,000
<i>Spirulina platensis</i>	-	-	9,000	-
Family Nostocaceae				
<i>Anabaena</i> sp.	20,000	-	9,000	-
<i>Pseudanabaena</i> sp.	20,000	-	18,000	11,000
<i>Richelia intracellularis</i>	-	40,000	-	-
Family Rivulariaceae				
<i>Calothrix</i> sp.	10,000	40,000	91,000	-

ตาราง ผลการวิเคราะห์แพลงก์ตอนพืชและแพลงก์ตอนสัตว์ (เก็บตัวอย่างวันที่ 8 สิงหาคม 2567)
(ต่อ)

กลุ่ม/สกุลของแพลงก์ตอน	ปริมาณแพลงก์ตอน (หน่วยต่อลูกบาศก์เมตร)			
	S1	S2	S3	S4
Division Chlorophyta				
Class Chlorophyceae				
Order Chlorococcales				
Family Hydrodictyaceae				
<i>Pediastrum duplex</i>	-	-	-	11,000
Family Coelastraceae				
<i>Coelastrum microporum</i>	-	-	-	11,000
Family Scenedesmaceae				
<i>Scenedesmus armatus</i>	-	-	145,000	-
Class Euglenophyceae				
Order Euglenales				
Family Euglenaceae				
<i>Euglena</i> sp.	-	-	9,000	-
<i>Lepocinclis ovum</i>	-	-	-	11,000
<i>Trachelomonas hispida</i>	-	-	9,000	-
Division Chromophyta				
Class Bacillariophyceae				
Order Biddulphales				
Suborder Coscinodiscineae				
Family Thalassiosiraceae				
<i>Cyclotella meneghiniana</i>	-	-	18,000	-
<i>Cyclotella striata</i>	99,000	10,000	27,000	-
<i>Lauderia annulata</i>	30,000	20,000	91,000	-
<i>Skeletonema costatum</i>	55,440,000	71,377,000	175,968,000	2,151,300,000
<i>Thalassiosira anguste-lineata</i>	20,000	20,000	-	-
<i>Thalassiosira eccentrica</i>	-	20,000	27,000	181,000

ตาราง ผลการวิเคราะห์แพลงก์ตอนพืชและแพลงก์ตอนสัตว์ (เก็บตัวอย่างวันที่ 8 สิงหาคม 2567)

(ต่อ)

กลุ่ม/สกุลของแพลงก์ตอน	ปริมาณแพลงก์ตอน (หน่วยต่อลูกบาศก์เมตร)			
	S1	S2	S3	S4
<i>Thalassiosira</i> sp.	-	374,000	-	-
<i>Thalassiosira subtilis</i>	-	20,000	-	-
Family Melosiraceae				
<i>Paralia sulcata</i>	-	20,000	9,000	32,000
Family Leptocylindraceae				
<i>Corethron criophilum</i>	30,000	10,000	-	11,000
Family Coscinodiscaceae				
<i>Coscinodiscus granii</i>	59,000	30,000	-	11,000
<i>Coscinodiscus radiatus</i>	20,000	141,000	136,000	75,000
<i>Coscinodiscus</i> sp.	10,000	-	-	-
Family Asterolampraceae				
<i>Asteromphalus flabellatus</i>	79,000	-	27,000	11,000
Family Heliopeltaceae				
<i>Actinoptychus grundler</i>	89,000	30,000	27,000	32,000
Suborder Rhizosoleniineae				
Family Rhizosoleniaceae				
<i>Dactyliosolen antarcticus</i>	167,000	192,000	-	11,000
<i>Dactyliosolen fragillissima</i>	109,000	232,000	-	11,000
<i>Guinardia cylindrus</i>	356,000	1,636,000	18,000	-
<i>Guinardia delicatula</i>	297,000	667,000	-	-
<i>Guinardia flaccida</i>	40,000	20,000	9,000	-
<i>Guinardia striata</i>	12,078,000	6,464,000	1,511,000	1,651,000
<i>Proboscia alata</i>	17,375,000	323,000	100,000	-
<i>Pseudosolenia calcar-avis</i>	119,000	152,000	-	40,000
<i>Rhizosolenia acuminata</i>	40,000	51,000	-	-
<i>Rhizosolenia imbricata</i>	20,000	10,000	-	-

ตาราง ผลการวิเคราะห์แพลงก์ตอนพืชและแพลงก์ตอนสัตว์ (เก็บตัวอย่างวันที่ 8 สิงหาคม 2567)
(ต่อ)

กลุ่ม/สกุลของแพลงก์ตอน	ปริมาณแพลงก์ตอน (หน่วยต่อลูกบาศก์เมตร)			
	S1	S2	S3	S4
<i>Rhizosolenia pungens</i>	297,000	40,000	453,000	-
<i>Rhizosolenia setigera</i>	624,000	354,000	-	117,000
<i>Rhizosolenia striata</i>	129,000	-	9,000	-
<i>Rhizosolenia styliformis</i>	-	40,000	-	11,000
Suborder Biddulphiineae				
Family Hemiaulaceae				
<i>Cerataulina bicornis</i>	168,000	354,000	-	-
<i>Cerataulina pelagica</i>	7,920,000	2,222,000	1,086,000	895,000
<i>Eucampia cornuta</i>	-	20,000	-	-
<i>Hemiaulus hauckii</i>	149,000	61,000	-	-
<i>Hemiaulus indicus</i>	-	970,000	-	-
<i>Hemiaulus</i> sp.	20,000	-	-	-
Family Biddulphiaceae				
<i>Biddulphia biddulphiana</i>	-	10,000	-	-
Family Chaetoceraceae				
<i>Bacteriastrum comosum</i>	139,000	424,000	-	11,000
<i>Bacteriastrum delicatulum</i>	1,535,000	737,000	18,000	138,000
<i>Bacteriastrum furcatum</i>	396,000	253,000	45,000	11,000
<i>Bacteriastrum</i> sp.	941,000	616,000	-	32,000
<i>Chaetoceros affinis</i>	79,000	364,000	-	117,000
<i>Chaetoceros compressus</i>	2,782,000	2,222,000	109,000	160,000
<i>Chaetoceros curvisetus</i>	416,000	212,000	154,000	11,000
<i>Chaetoceros danicus</i>	149,000	30,000	-	-
<i>Chaetoceros debilis</i>	109,000	172,000	-	-
<i>Chaetoceros decipiens</i>	20,000	-	-	-
<i>Chaetoceros didymus</i>	1,416,000	788,000	181,000	692,000

ตาราง ผลการวิเคราะห์แพลงก์ตอนพืชและแพลงก์ตอนสัตว์ (เก็บตัวอย่างวันที่ 8 สิงหาคม 2567)
(ต่อ)

กลุ่ม/สกุลของแพลงก์ตอน	ปริมาณแพลงก์ตอน (หน่วยต่อลูกบาศก์เมตร)			
	S1	S2	S3	S4
<i>Chaetoceros diversus</i>	248,000	40,000	9,000	21,000
<i>Chaetoceros furcellatus</i>	-	-	679,000	458,000
<i>Chaetoceros laciniosus</i>	376,000	152,000	9,000	-
<i>Chaetoceros lauderi</i>	-	212,000	-	-
<i>Chaetoceros lorenzianus</i>	327,000	172,000	18,000	426,000
<i>Chaetoceros messanensis</i>	20,000	-	-	-
<i>Chaetoceros mita</i>	1,436,000	404,000	9,000	-
<i>Chaetoceros peruvianus</i>	-	20,000	-	11,000
<i>Chaetoceros pseudocurvisetus</i>	257,000	20,000	100,000	32,000
<i>Chaetoceros radicans</i>	40,000	152,000	-	21,000
<i>Chaetoceros rostratus</i>	10,000	-	-	-
<i>Chaetoceros</i> sp.	812,000	1,222,000	145,000	777,000
<i>Chaetoceros subtilis</i>	10,000	-	-	-
<i>Chaetoceros teres</i>	-	30,000	-	21,000
Family Lithodermaceae				
<i>Ditylum brightwellii</i>	-	-	9,000	-
Family Eupodiscaceae				
<i>Odontella aurita</i>	-	-	-	21,000
<i>Odontella sinensis</i>	10,000	10,000	-	11,000
Order Bacillariales				
Suborder Fragilariineae				
Family Fragilariaceae				
<i>Fragilaria capucina</i>	-	-	18,000	-
<i>Synedra ulna</i>	-	20,000	-	-
Family Thalassionemataceae				
<i>Thalassionema frauenfeldii</i>	277,000	323,000	643,000	1,225,000

ตาราง ผลการวิเคราะห์แพลงก์ตอนพืชและแพลงก์ตอนสัตว์ (เก็บตัวอย่างวันที่ 8 สิงหาคม 2567)
(ต่อ)

กลุ่ม/สกุลของแพลงก์ตอน	ปริมาณแพลงก์ตอน (หน่วยต่อลูกบาศก์เมตร)			
	S1	S2	S3	S4
<i>Thalassionema nitzschioides</i>	505,000	960,000	27,000	522,000
<i>Thalassionema</i> sp.	-	-	-	11,000
<i>Thalassiothrix</i> sp.	30,000	10,000	9,000	-
Family Licmophoriaceae				
<i>Licmophora abbreviata</i>	-	10,000	18,000	-
Family Striatellaceae				
<i>Striatella unipunctata</i>	158,000	-	407,000	426,000
Suborder Bacillariineae				
Family Eunotiaceae				
<i>Eunotia flexuosa</i>	20,000	-	-	-
Family Achnanthaceae				
<i>Cocconeis scutellum</i>	-	-	9,000	-
Family Lyrellaceae				
<i>Lyrella lyra</i>	10,000	-	-	-
Family Naviculaceae				
<i>Amphora robusta</i>	30,000	10,000	18,000	21,000
<i>Amphora</i> sp.	10,000	-	9,000	11,000
<i>Diploneis smithii</i>	30,000	-	-	-
<i>Gyrosigma balticum</i>	-	-	9,000	32,000
<i>Haslea tromphii</i>	10,000	-	9,000	-
<i>Meunier membranacea</i>	40,000	101,000	9,000	-
<i>Navicula cuspidata</i>	-	10,000	-	-
<i>Navicula lanceolata</i>	-	-	18,000	11,000
<i>Navicula</i> sp.	10,000	10,000	9,000	11,000
<i>Pinnularia</i> sp.	20,000	10,000	9,000	-
<i>Pleurosigma aestuarii</i>	-	10,000	-	-

ตาราง ผลการวิเคราะห์แพลงก์ตอนพืชและแพลงก์ตอนสัตว์ (เก็บตัวอย่างวันที่ 8 สิงหาคม 2567)
(ต่อ)

กลุ่ม/สกุลของแพลงก์ตอน	ปริมาณแพลงก์ตอน (หน่วยต่อลูกบาศก์เมตร)			
	S1	S2	S3	S4
<i>Pleurosigma angulatum</i>	69,000	20,000	-	11,000
<i>Pleurosigma elongatum</i>	-	-	-	32,000
<i>Pleurosigma normanii</i>	50,000	-	9,000	-
<i>Pleurosigma</i> sp.	40,000	20,000	18,000	107,000
<i>Trachyneis</i> sp.	20,000	10,000	-	-
Family Bacillariaceae				
<i>Bacillaria paxillifer</i>	50,000	162,000	18,000	405,000
<i>Cylindrotheca closterium</i>	1,782,000	111,000	1,738,000	13,419,000
<i>Nitzschia lorenziana</i>	10,000	-	9,000	32,000
<i>Nitzschia recta</i>	-	-	-	21,000
<i>Pseudo-nitzschia heimii</i>	2,376,000	4,040,000	643,000	373,000
<i>Pseudo-nitzschia lineola</i>	-	2,424,000	54,000	511,000
<i>Pseudo-nitzschia pungens</i>	-	20,000	-	11,000
<i>Pseudo-nitzschia</i> sp.	34,452,000	26,866,000	4,797,000	11,289,000
<i>Tryblionella victoriae</i>	-	10,000	18,000	-
Family Surirellaceae				
<i>Entomoneis alata</i>	-	-	-	11,000
<i>Entomoneis robusta</i>	99,000	30,000	-	-
Class Dinophyceae				
Order Prorocentrales				
Family Prorocentraceae				
<i>Prorocentrum mexicanum</i>	10,000	-	-	-
<i>Prorocentrum micans</i>	20,000	30,000	9,000	-
Order Dinophysiales				
Family Dinophysiaceae				
<i>Dinophysis caudata</i>	30,000	121,000	-	-

ตาราง ผลการวิเคราะห์แพลงก์ตอนพืชและแพลงก์ตอนสัตว์ (เก็บตัวอย่างวันที่ 8 สิงหาคม 2567)
(ต่อ)

กลุ่ม/สกุลของแพลงก์ตอน	ปริมาณแพลงก์ตอน (หน่วยต่อลูกบาศก์เมตร)			
	S1	S2	S3	S4
<i>Phalacroma rudgei</i>	-	-	-	11,000
Order Gymnodiniales				
Family Gymnodinium				
<i>Gyrodinium instriatum</i>	40,000	30,000	-	-
Order Noctilucales				
Family Noctilucaeae				
<i>Noctiluca scintillans</i>	228,000	20,000	-	53,000
Order Gonyaulacalea				
Family Ceratiaceae				
<i>Ceratium deflexum</i>	-	30,000	-	-
<i>Ceratium furca</i>	40,000	-	9,000	-
<i>Ceratium fusus</i>	30,000	172,000	-	-
<i>Ceratium macroceros</i>	10,000	30,000	-	-
<i>Ceratium porrectum</i>	-	10,000	-	-
Family GoniDOMACEAE				
<i>Goniodoma polyedricum</i>	30,000	30,000	-	-
Family Gonyaulacaceae				
<i>Gonyaulax diegensis.</i>	20,000	30,000	-	-
<i>Gonyaulax sp.</i>	-	40,000	9,000	43,000
Family Pyrophacaceae				
<i>Pyrophacus horologium</i>	-	40,000	9,000	-
Order Peridiniales				
Family Calciodinellaceae				
<i>Scripsiella trochoidea</i>	40,000	131,000	290,000	970,000
Family Peridiniaceae				
<i>Peridinium gatunense</i>	20,000	20,000	-	-

ตาราง ผลการวิเคราะห์แพลงก์ตอนพืชและแพลงก์ตอนสัตว์ (เก็บตัวอย่างวันที่ 8 สิงหาคม 2567)
(ต่อ)

กลุ่ม/สกุลของแพลงก์ตอน	ปริมาณแพลงก์ตอน (หน่วยต่อลูกบาศก์เมตร)			
	S1	S2	S3	S4
<i>Peridinium quinquecorne</i>	-	-	235,000	21,000
Family Podolampadaceae				
<i>Podolampas palmipes</i>	-	10,000	-	-
Family Protoperidiniaceae				
<i>Protoperidinium abei</i>	10,000	-	-	-
<i>Protoperidinium angustum</i>	40,000	71,000	109,000	756,000
<i>Protoperidinium conicum</i>	20,000	10,000	18,000	128,000
<i>Protoperidinium curtipes</i>	119,000	20,000	9,000	21,000
<i>Protoperidinium depressum</i>	10,000	20,000	-	11,000
<i>Protoperidinium latispinum</i>	40,000	10,000	-	-
<i>Protoperidinium ovum</i>	-	30,000	-	-
<i>Protoperidinium pellucidum</i>	564,000	1,010,000	18,000	21,000
<i>Protoperidinium sp.</i>	366,000	384,000	136,000	777,000
<i>Protoperidinium spinulosum</i>	10,000	-	-	-
<i>Protoperidinium thorianum</i>	-	-	18,000	-
แพลงก์ตอนสัตว์				
Phylum Protozoa				
Subphylum Plasmodroma				
Class Sarcodina				
Subclass Rhizopoda				
Order Testacida				
Family Arcellidae				
<i>Arcella vulgaris</i>	10,000	-	-	-
Family Euglyphidae				
<i>Euglypha acanthophora</i>	-	-	-	11,000

ตาราง ผลการวิเคราะห์แพลงก์ตอนพืชและแพลงก์ตอนสัตว์ (เก็บตัวอย่างวันที่ 8 สิงหาคม 2567)

(ต่อ)

กลุ่ม/สกุลของแพลงก์ตอน	ปริมาณแพลงก์ตอน (หน่วยต่อลูกบาศก์เมตร)			
	S1	S2	S3	S4
Subphylum Ciliophora				
Class Ciliata				
Subclass Spirotricha				
Order Tintinnida				
Family Tintinnididae				
<i>Leprotintinnus nordquisti</i>	-	10,000	-	-
Family Codonellidae				
<i>Tintinnopsis meunieri</i>	-	-	-	11,000
<i>Tintinnopsis</i> sp.	10,000	-	9,000	11,000
<i>Tintinnopsis tocantinensis</i>	-	-	-	21,000
Family Codonellopsidae				
<i>Stenosemella nivalis</i>	-	-	27,000	64,000
Family Cyttarocyliidae				
<i>Favella panamensis</i>	-	-	-	11,000
Family Tintinnidae				
<i>Eutintinnus perminutus</i>	-	10,000	-	-
Subclass Peritricha				
Order Peritrichida				
<i>Vorticella</i> sp.	-	-	-	85,000
Phylum Rotifera				
Class Monogononta				
Order Ploima				
Family Lecanidae				
<i>Lecane bulla</i>	-	-	-	11,000
<i>Lecane papuana</i>	-	-	-	11,000

ตาราง ผลการวิเคราะห์แพลงก์ตอนพืชและแพลงก์ตอนสัตว์ (เก็บตัวอย่างวันที่ 8 สิงหาคม 2567)
(ต่อ)

กลุ่ม/สกุลของแพลงก์ตอน	ปริมาณแพลงก์ตอน (หน่วยต่อลูกบาศก์เมตร)			
	S1	S2	S3	S4
Phylum Annelida				
Class Polychaeta				
Polychaete larvae	10,000	10,000	-	32,000
Phylum Arthropoda				
Class Crustacea				
Subclass Copepoda				
Copepod nauplius	139,000	111,000	91,000	767,000
Order Calanoida				
Calanoid copepod	20,000	10,000	-	85,000
Order Cyclopoida				
Cyclopoid copepod	10,000	-	9,000	-
Order Harpacticoida				
Harpacticoid copepod	10,000	-	-	-
Subclass Cirripedia				
Cirripede nauplius	10,000	10,000	27,000	53,000
Phylum Mollusca				
Class Bivalvia				
Pelecypod larvae	-	-	9,000	11,000
Phylum Chordata				
Subphylum Urochordata				
Class Larvacea				
Family Oikopleuridae				
<i>Oikopleura</i> sp.	10,000	-	-	11,000

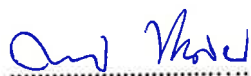
ตาราง ผลการวิเคราะห์แพลงก์ตอนพืชและแพลงก์ตอนสัตว์ (เก็บตัวอย่างวันที่ 8 สิงหาคม 2567)

(ต่อ)

กลุ่ม/สกุลของแพลงก์ตอน	ปริมาณแพลงก์ตอน (หน่วยต่อลูกบาศก์เมตร)			
	S1	S2	S3	S4
ชนิดของแพลงก์ตอนพืช	98	101	75	71
ชนิดของแพลงก์ตอนสัตว์	9	6	6	15
ชนิดแพลงก์ตอนรวม	107	107	81	86
ปริมาณแพลงก์ตอนพืช	149,533,000	132,435,000	191,066,000	2,189,007,000
ปริมาณแพลงก์ตอนสัตว์	229,000	161,000	172,000	1,195,000
ปริมาณแพลงก์ตอนรวม	149,762,000	132,596,000	191,238,000	2,190,202,000
ค่าดัชนีความหลากหลายแพลงก์ตอนพืช	2.1076	1.8431	0.4902	0.1249
ค่าดัชนีความหลากหลายแพลงก์ตอนสัตว์	1.4731	1.1194	1.3813	1.4688
ค่าดัชนีความสม่ำเสมอแพลงก์ตอนพืช	0.4597	0.3994	0.1135	0.0293
ค่าดัชนีความสม่ำเสมอแพลงก์ตอนสัตว์	0.6704	0.6247	0.7709	0.5424

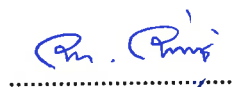
หมายเหตุ :

1. สถานี S1 : เกาะสะเก็ด
2. สถานี S2 : หาดทรายทอง
3. สถานี S3 : จุกระบายน้ำทิ้งของโรงกลั่นน้ำมันลงทะเล
4. สถานี S4 : ทะเลเปิด



(นางสาวกนกวรรณ ขาวค่อน)

ผู้วิเคราะห์



(นายอลงกต อินทรชาติ)

หัวหน้าสถานีวิจัยประมงศรีราชา



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

รายงานผลการวิเคราะห์สัตว์หน้าดิน

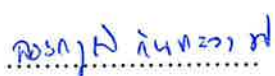
ตาราง ผลการวิเคราะห์สัตว์หน้าดิน (เก็บตัวอย่างวันที่ 8 สิงหาคม 2567)

สกุลสัตว์หน้าดิน	ปริมาณสัตว์หน้าดิน (ตัวต่อตารางเมตร)			
	S1	S2	S3	S4
Phylum Annelida				
Class Polychaeta				
Order Eunicida				
Family Eunicidae				
<i>Marphysa</i> sp. (ไส้เดือนทะเล)	45	15	30	15
Order Spionida				
Family Magelonidae				
<i>Magelona</i> sp. (ไส้เดือนทะเล)	-	15	-	-
Phylum Arthropoda				
Class Malacostraca				
Order Decapoda				
Family Diogenidae				
<i>Diogenes</i> sp. (ปูเสฉวน)	-	15	-	-
Family Portunidae				
<i>Portunus</i> sp. (ปูม้า)	30	15	-	-

ตาราง ผลการวิเคราะห์สัตว์หน้าดิน (เก็บตัวอย่างวันที่ 8 สิงหาคม 2567)(ต่อ)

สกุลสัตว์หน้าดิน	ปริมาณสัตว์หน้าดิน (ตัวต่อตารางเมตร)			
	S1	S2	S3	S4
Phylum Mollusca Class Bivalvia Order Cardiida Family Tellinidae <i>Tellina</i> sp. (หอยสองฝาชนิดหนึ่ง)	30	-	-	15
Phylum Chordata Class Leptocardii Order Amphioxiformes Family Branchiostomidae <i>Branchiostoma</i> sp. (แอมฟิออกซัส)	15	15	-	15
สกุลสัตว์หน้าดิน	4	5	1	3
ปริมาณสัตว์หน้าดิน	120	75	30	45
ค่าดัชนีความหลากหลายสัตว์หน้าดิน	1.3209	1.6094	0.0000	1.0986

- หมายเหตุ :
1. สถานี S1 : เกาะสะเก็ด
 2. สถานี S2 : หาดทรายทอง
 3. สถานี S3 : จุกระบายน้ำทิ้งของโรงกลั่นน้ำมันลงทะเล
 4. สถานี S4 : ทะเลเปิด



(นายอรรถวุฒิ กันทะวงศ์)

ผู้วิเคราะห์



(นายอลงกต อินทรชาติ)

หัวหน้าสถานีวิจัยประมงศรีราชา



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

รายงานผลการวิเคราะห์แพลงก์ตอนพืชและแพลงก์ตอนสัตว์
ตาราง ผลการวิเคราะห์แพลงก์ตอนพืชและแพลงก์ตอนสัตว์ (เก็บตัวอย่างวันที่ 13 ธันวาคม 2567)

กลุ่ม/สกุลของแพลงก์ตอน	ปริมาณแพลงก์ตอน (หน่วยต่อลูกบาศก์เมตร)			
	S1	S2	S3	S4
แพลงก์ตอนพืช				
Division Cyanophyta				
Class Cyanophyceae				
Order Nostocales				
Family Oscillatoriaceae				
<i>Oscillatoria</i> sp.	9,000	-	9,000	125,000
<i>Oscillatoria tenuis</i>	348,000	17,000	-	166,000
Family Nostocaceae				
<i>Anabaenopsis</i> sp.	-	-	-	17,000
<i>Pseudanabaena</i> sp.	9,000	8,000	-	-
Family Rivulariaceae				
<i>Calothrix parietana</i>	-	-	18,000	8,000
Division Chlorophyta				
Class Chlorophyceae				
Order Chlorococcales				
Family Hydrodictyaceae				
<i>Pediastrum simplex</i>	9,000	-	-	-

ตาราง ผลการวิเคราะห์แพลงก์ตอนพืชและแพลงก์ตอนสัตว์ (เก็บตัวอย่างวันที่ 13 ธันวาคม 2567)

(ต่อ)

กลุ่ม/สกุลของแพลงก์ตอน	ปริมาณแพลงก์ตอน (หน่วยต่อลูกบาศก์เมตร)			
	S1	S2	S3	S4
Family Scenedesmaceae				
<i>Scenedesmus bijuga</i>	-	-	18,000	-
<i>Scenedesmus opoliensis</i>	-	-	99,000	-
<i>Scenedesmus quadricauda</i>	9,000	-	36,000	-
Order Zygnematales				
Family Desmidiaceae				
<i>Cosmarium</i> sp.	-	-	9,000	-
<i>Staurostrum freemanii</i>	-	-	9,000	-
Division Chromophyta				
Class Bacillariophyceae				
Order Biddulphales				
Suborder Coscinodiscineae				
Family Thalassiosiraceae				
<i>Cyclotella meneghiniana</i>	9,000	-	126,000	-
<i>Cyclotella striata</i>	-	218,000	-	17,000
<i>Planktoniella sol</i>	-	17,000	-	-
<i>Skeletonema costatum</i>	91,650,000	231,000,000	983,997,000	996,000
<i>Thalassiosira eccentrica</i>	28,000	-	-	-
<i>Thalassiosira</i> sp.	38,000	302,000	324,000	245,000
Family Melosiraceae				
<i>Melosira dubia</i>	9,000	-	18,000	-
<i>Paralia sulcata</i>	-	-	-	50,000
Family Leptocylindraceae				
<i>Corethron criophilum</i>	19,000	-	-	-
Family Coscinodiscaceae				
<i>Coscinodiscus concinniformis</i>	38,000	-	-	-

ตาราง ผลการวิเคราะห์แพลงก์ตอนพืชและแพลงก์ตอนสัตว์ (เก็บตัวอย่างวันที่ 13 ธันวาคม 2567)

(ต่อ)

กลุ่ม/สกุลของแพลงก์ตอน	ปริมาณแพลงก์ตอน (หน่วยต่อลูกบาศก์เมตร)			
	S1	S2	S3	S4
<i>Coscinodiscus radiatus</i>	-	-	-	8,000
<i>Coscinodiscus</i> sp.	9,000	25,000	117,000	-
<i>Coscinodiscus wailesii</i>	9,000	-	-	-
Family Asterolampraceae				
<i>Asterolampra marylandica</i>	28,000	-	-	-
Family Heliopeltaceae				
<i>Actinoptychus octonarius</i>	19,000	17,000	315,000	-
<i>Actinoptychus</i> sp.	-	-	18,000	-
Suborder Rhizosoleniineae				
Family Rhizosoleniaceae				
<i>Dactyliosolen antarcticus</i>	19,000	-	-	-
<i>Proboscia alata</i>	620,000	202,000	-	299,000
<i>Pseudosolenia calcar-avis</i>	15,040,000	4,032,000	927,000	2,158,000
<i>Rhizosolenia acuminata</i>	310,000	109,000	-	100,000
<i>Rhizosolenia imbricata</i>	-	8,000	-	25,000
<i>Rhizosolenia pungens</i>	1,468,000	39,330,000	135,000,000	-
<i>Rhizosolenia setigera</i>	-	92,000	117,000	-
<i>Rhizosolenia</i> sp.	-	-	-	375,000
<i>Rhizosolenia striata</i>	9,000	17,000	-	8,000
Suborder Biddulphiineae				
Family Hemiaulaceae				
<i>Cerataulina bicornis</i>	-	17,000	-	17,000
<i>Cerataulina pelagica</i>	19,000	-	-	-
<i>Eucampia cornuta</i>	-	8,000	-	-
<i>Hemiaulus hauckii</i>	150,000	17,000	-	-
<i>Hemiaulus indicus</i>	113,000	-	-	8,000

ตาราง ผลการวิเคราะห์แพลงก์ตอนพืชและแพลงก์ตอนสัตว์ (เก็บตัวอย่างวันที่ 13 ธันวาคม 2567)
(ต่อ)

กลุ่ม/สกุลของแพลงก์ตอน	ปริมาณแพลงก์ตอน (หน่วยต่อลูกบาศก์เมตร)			
	S1	S2	S3	S4
<i>Hemiaulus sinensis</i>	19,000	-	-	-
Family Cymatosiraceae				
<i>Cymatosira belgica</i>	-	8,000	-	-
Family Chaetoceraceae				
<i>Bacteriastrum delicatulum</i>	28,000	-	-	-
<i>Chaetoceros costatus</i>	-	17,000	-	8,000
<i>Chaetoceros curvisetus</i>	1,692,000	378,000	5,220,000	-
<i>Chaetoceros lorenzianus</i>	-	-	18,000	-
<i>Chaetoceros mitra</i>	-	8,000	-	8,000
<i>Chaetoceros pseudocurvisetus</i>	141,000	92,000	234,000	-
<i>Chaetoceros</i> sp.	28,000	-	-	-
Family Lithodesmaceae				
<i>Bellerocha horologicalis</i>	28,000	17,000	-	-
<i>Helicotheca tamesis</i>	893,000	3,864,000	1,860,000	-
Family Eupodiscaceae				
<i>Odontella mobiliensis</i>	-	8,000	9,000	-
<i>Odontella sinensis</i>	-	17,000	-	-
<i>Odontella</i> sp.	-	17,000	9,000	8,000
Order Bacillariales				
Suborder Fragilariineae				
Family Thalassionemataceae				
<i>Thalassionema frauenfeldii</i>	-	8,000	9,000	-
<i>Thalassionema</i> sp.	19,000	-	-	-
Family Licmophoriaceae				
<i>Licmophora abbreviata</i>	-	8,000	-	-

ตาราง ผลการวิเคราะห์แพลงก์ตอนพืชและแพลงก์ตอนสัตว์ (เก็บตัวอย่างวันที่ 13 ธันวาคม 2567)

(ต่อ)

กลุ่ม/สกุลของแพลงก์ตอน	ปริมาณแพลงก์ตอน (หน่วยต่อลูกบาศก์เมตร)			
	S1	S2	S3	S4
Suborder Bacillariineae				
Family Achnantheaceae				
<i>Achnanthes longipes</i>	197,000	-	-	-
Family Naviculaceae				
<i>Amphora</i> sp.	9,000	-	-	-
<i>Diploneis bombus</i>	-	8,000	-	-
<i>Diploneis smithii</i>	19,000	8,000	-	-
<i>Diploneis</i> sp.	-	-	-	8,000
<i>Navicula cuspidata</i>	-	-	180,000	-
<i>Navicula</i> sp.	9,000	-	9,000	-
<i>Pinnularia microstauron</i>	-	-	18,000	-
<i>Pleurosigma aestuarii</i>	9,000	34,000	-	-
<i>Pleurosigma angulatum</i>	188,000	470,000	324,000	141,000
<i>Pleurosigma elongatum</i>	-	34,000	-	-
<i>Pleurosigma normanii</i>	28,000	17,000	-	17,000
<i>Pleurosigma</i> sp.	197,000	-	18,000	-
<i>Trachyneis</i> sp.	-	25,000	-	17,000
Family Bacillariaceae				
<i>Bacillaria paxillifer</i>	-	1,176,000	45,000	-
<i>Cylindrotheca closterium</i>	1,748,000	130,477,000	32,400,000	-
<i>Nitzschia lorenziana</i>	-	17,000	108,000	-
<i>Nitzschia sigmaidea</i>	-	-	135,000	-
<i>Nitzschia</i> sp.	-	84,000	9,000	-
<i>Pseudo-nitzschia heimii</i>	-	84,000	-	-
<i>Tryblionella victoriae</i>	-	8,000	-	-

ตาราง ผลการวิเคราะห์แพลงก์ตอนพืชและแพลงก์ตอนสัตว์ (เก็บตัวอย่างวันที่ 13 ธันวาคม 2567)
(ต่อ)

กลุ่ม/สกุลของแพลงก์ตอน	ปริมาณแพลงก์ตอน (หน่วยต่อลูกบาศก์เมตร)			
	S1	S2	S3	S4
Family Surirellaceae				
<i>Surirella ovata</i>	-	-	9,000	8,000
<i>Surirella</i> sp.	-	-	9,000	-
Class Dinophyceae				
Order Prorocentrales				
Family Prorocentraceae				
<i>Prorocentrum micans</i>	9,000	-	-	8,000
<i>Prorocentrum sigmoides</i>	122,000	-	-	17,000
Order Dinophysiaceae				
Family Dinophysiaceae				
<i>Dinophysis caudata</i>	-	-	-	17,000
<i>Phalacroma rudgei</i>	9,000	-	-	17,000
Order Gymnodiniales				
Family Gymnodinium				
<i>Gymnodinium sanguineum</i>	9,000	-	-	-
<i>Gyrodinium instriatum</i>	-	-	-	8,000
<i>Gyrodinium spirale</i>	9,000	-	-	-
Order Gonyaulacalea				
Family Ceratiaceae				
<i>Ceratium deflexum</i>	-	-	-	8,000
<i>Ceratium furca</i>	-	42,000	-	17,000
<i>Ceratium fusus</i>	56,000	-	-	33,000
<i>Ceratium macroceros</i>	-	-	-	17,000
Family Pyrocystaceae				
<i>Pyrophacus horogium</i>	-	-	-	8,000

ตาราง ผลการวิเคราะห์แพลงก์ตอนพืชและแพลงก์ตอนสัตว์ (เก็บตัวอย่างวันที่ 13 ธันวาคม 2567)

(ต่อ)

กลุ่ม/สกุลของแพลงก์ตอน	ปริมาณแพลงก์ตอน (หน่วยต่อลูกบาศก์เมตร)			
	S1	S2	S3	S4
Order Peridiniales				
Family Calciadinellaceae				
<i>Scrippsiella trochoidea</i>	160,000	-	9,000	-
Family Protoperidiniaceae				
<i>Protoperidinium conicum</i>	-	8,000	9,000	-
<i>Protoperidinium depressum</i>	-	-	-	8,000
<i>Protoperidinium oblongum</i>	-	-	27,000	-
<i>Protoperidinium oceanicum</i>	9,000	-	-	-
<i>Protoperidinium</i> sp.	19,000	-	18,000	-
แพลงก์ตอนสัตว์				
Phylum Protozoa				
Subphylum Plasmodroma				
Class Sarcodina				
Subclass Rhizopoda				
Order Testacida				
Family Arcellidae				
<i>Arcella</i> sp.	19,000	-	9,000	-
Family Diffugiidae				
<i>Centropyxis aculeata</i>	-	-	27,000	-
<i>Diffugia urceolata</i>	-	-	18,000	-
Family Euglyphidae				
<i>Euglypha acanthophora</i>	-	-	36,000	-
<i>Euglypha rotunda</i>	-	8,000	18,000	-
<i>Euglypha</i> sp.	-	-	9,000	-

ตาราง ผลการวิเคราะห์เพลงก้นตื้นและเพลงก้นตื้นสัตว์ (เก็บตัวอย่างวันที่ 13 ธันวาคม 2567)
(ต่อ)

กลุ่ม/สกุลของเพลงก้นตื้น	ปริมาณเพลงก้นตื้น (หน่วยต่อลูกบาศก์เมตร)			
	S1	S2	S3	S4
Subphylum Ciliophora				
Class Ciliata				
Subclass Spirotricha				
Order Tintinnida				
Family Tintinnididae				
<i>Leprotintinnus nordquisti</i>	19,000	17,000	-	-
Family Codonellidae				
<i>Tintinnopsis beroidea</i>	9,000	-	-	17,000
<i>Tintinnopsis buetschlii</i>	-	8,000	-	-
<i>Tintinnopsis meunieri</i>	-	-	18,000	-
<i>Tintinnopsis radix</i>	-	-	9,000	8,000
<i>Tintinnopsis subacuta</i>	-	-	18,000	-
<i>Tintinnopsis tocaninensis</i>	-	8,000	45,000	-
Family Codonellopsidae				
<i>Stenosemella nivalis</i>	-	-	-	42,000
Family Coxiellidae				
<i>Helicostomella fusiformis</i>	94,000	42,000	-	531,000
Family Cyttarocylidae				
<i>Favella panamensis</i>	-	-	36,000	-
Family Petalotrichidae				
<i>Metacylis pithos</i>	-	-	-	33,000
Family Tintinnidae				
<i>Amphorella infundibulum</i>	-	-	-	17,000
<i>Dadayiella curta</i>	-	-	-	8,000
Order Hypotrichida				
<i>Euplotes</i> sp.	-	-	9,000	-

ตาราง ผลการวิเคราะห์แพลงก์ตอนพืชและแพลงก์ตอนสัตว์ (เก็บตัวอย่างวันที่ 13 ธันวาคม 2567)

(ต่อ)

กลุ่ม/สกุลของแพลงก์ตอน	ปริมาณแพลงก์ตอน (หน่วยต่อลูกบาศก์เมตร)			
	S1	S2	S3	S4
Subclass Peritricha				
Order Peritrichida				
<i>Vorticella</i> sp.	-	-	27,000	-
Phylum Rotifera				
Class Monogononta				
Order Ploima				
Family Brachionidae				
<i>Brachionus angularis</i>	-	-	9,000	-
Family Lecanidae				
<i>Lecane bulla</i>	-	-	9,000	-
<i>Lecane inermis</i>	19,000	-	27,000	17,000
Family Asplanchnidae				
<i>Asplanchna priodonta</i>	-	-	9,000	8,000
Phylum Annelida				
Class Polychaeta				
Polychaete larvae	-	-	234,000	-
Phylum Arthropoda				
Class Crustacea				
Subclass Copepoda				
Copepod nauplius	160,000	101,000	225,000	382,000
Order Calanoida				
Calanoid copepod	19,000	8,000	36,000	-
Order Cyclopoida				
Cyclopoid copepod	28,000	-	45,000	25,000
Order Harpacticoida				
Harpacticoid copepod	-	17,000	-	-

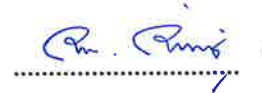
ตาราง ผลการวิเคราะห์แพลงก์ตอนพืชและแพลงก์ตอนสัตว์ (เก็บตัวอย่างวันที่ 13 ธันวาคม 2567)
(ต่อ)

กลุ่ม/สกุลของแพลงก์ตอน	ปริมาณแพลงก์ตอน (หน่วยต่อลูกบาศก์เมตร)			
	S1	S2	S3	S4
Subclass Cirripedia				
Order Balanomorphia				
Family Balanidae				
<i>Balanus</i> sp.	-	-	27,000	-
Phylum Mollusca				
Class Gastropoda				
Gastropod larvae	-	-	-	8,000
Class Bivalvia				
Pelecypod larvae	56,000	17,000	-	83,000
Phylum Chordata				
Subphylum Urochordata				
Class Larvacea				
Order Urochorda				
Family Oikopleuridae				
<i>Oikopleura</i> sp.	9,000	-	45,000	8,000
ชนิดของแพลงก์ตอนพืช	51	47	41	36
ชนิดของแพลงก์ตอนสัตว์	10	9	23	14
ชนิดแพลงก์ตอนรวม	61	56	64	50
ปริมาณแพลงก์ตอนพืช	115,642,000	412,395,000	1,161,951,000	4,995,000
ปริมาณแพลงก์ตอนสัตว์	432,000	226,000	945,000	1,187,000
ปริมาณแพลงก์ตอนรวม	116,074,000	412,621,000	1,162,896,000	6,182,000
ค่าดัชนีความหลากหลายแพลงก์ตอนพืช	0.8462	1.0669	0.5507	2.0229
ค่าดัชนีความหลากหลายแพลงก์ตอนสัตว์	1.8528	1.7296	2.5141	1.5608
ค่าดัชนีความสม่ำเสมอแพลงก์ตอนพืช	0.2152	0.2771	0.1483	0.5645
ค่าดัชนีความสม่ำเสมอแพลงก์ตอนสัตว์	0.8047	0.7872	0.8018	0.5914

- หมายเหตุ :
1. สถานี S1 : เกาะสะเก็ด
 2. สถานี S2 : หาดทรายทอง
 3. สถานี S3 : จุดระบายน้ำทิ้งของโรงกลั่นน้ำมันลงทะเล
 4. สถานี S4 : ทะเลเปิด



(นางสาวกนกวรรณ ขาวด่อน)
ผู้วิเคราะห์



(นายอลงกต อินทรชาติ)
หัวหน้าสถานีวิจัยประมงศรีราชา



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

รายงานผลการวิเคราะห์สัตว์หน้าดิน

ตาราง ผลการวิเคราะห์สัตว์หน้าดิน (เก็บตัวอย่างวันที่ 13 ธันวาคม 2567)

สกุลสัตว์หน้าดิน	ปริมาณสัตว์หน้าดิน (ตัวต่อตารางเมตร)			
	S1	S2	S3	S4
Phylum Annelida				
Class Polychaeta				
Order Amphinomida				
Family Amphinomidae				
<i>Linopherus</i> sp. (ไส้เดือนทะเล)	-	-	15	-
Order Capitellida				
Family Capitellidae				
<i>Heteromastus</i> sp. (ไส้เดือนทะเล)	-	149	-	-
Order Opheliida				
Family Opheliidae				
<i>Armandia</i> sp. (ไส้เดือนทะเล)	30	-	-	178
Order Orbiniida				
Family Orbiniidae				
<i>Scoloplos</i> sp. (ไส้เดือนทะเล)	-	-	-	15
Order Phyllodocida				
Family Glyceridae				
<i>Glycera</i> sp. (ไส้เดือนทะเล)	30	-	-	-
Family Nephtyidae				
<i>Nephtys</i> sp. (ไส้เดือนทะเล)	45	-	-	30


ตาราง ผลการวิเคราะห์สัตว์หน้าดิน (เก็บตัวอย่างวันที่ 13 ธันวาคม 2567) (ต่อ)


สกุลสัตว์หน้าดิน	ปริมาณสัตว์หน้าดิน (ตัวต่อตารางเมตร)			
	S1	S2	S3	S4
Order Spionida Family Spionidae <i>Prionospio</i> sp. (ไส้เดือนทะเล) Order Terebellida Family Cirratulidae <i>Chaetozone</i> sp. (ไส้เดือนทะเล)	45	-	-	-
Phylum Arthropoda Class Malacostraca Order Decapoda Family Penaeidae <i>Metapenaeus</i> sp. (กุ้งชนิดหนึ่ง)	15	-	-	-
Phylum Mollusca Class Gastropoda Order Caenogastropoda Family Cerithiidae <i>Cerithium</i> sp. (หอยขี้นก) Class Bivalvia Order Cardiida Family Tellinidae <i>Tellina</i> sp. (หอยสองฝาชนิดหนึ่ง)	460	-	-	-
Phylum Echinodermata Class Holothuroidea Order Holothuriida Family Holothuriidae <i>Holothuria</i> sp. (ปลิงดำ)	-	-	-	30

ตาราง ผลการวิเคราะห์สัตว์หน้าดิน (เก็บตัวอย่างวันที่ 13 ธันวาคม 2567) (ต่อ)

สกุลสัตว์หน้าดิน	ปริมาณสัตว์หน้าดิน (ตัวต่อตารางเมตร)			
	S1	S2	S3	S4
Phylum Chordata				
Class Leptocardii				
Order Amphioxiformes				
Family Branchiostomidae				
<i>Branchiostoma</i> sp. (แอมฟิออกซัส)	15	-	-	
สกุลสัตว์หน้าดิน	8	2	1	4
ปริมาณสัตว์หน้าดิน	670	268	15	253
ค่าดัชนีความหลากหลายสัตว์หน้าดิน	1.2083	0.6869	0.0000	0.9205

- หมายเหตุ :
1. สถานี S1 : เกาะสะเก็ด
 2. สถานี S2 : หาดทรายทอง
 3. สถานี S3 : จุดระบายน้ำทิ้งของโรงกลั่นน้ำมันลงทะเล
 4. สถานี S4 : ทะเลเปิด


 (นายอรรถวุฒิ กันทะวงศ์)
 ผู้วิเคราะห์


 (นายอรรถวุฒิ กันทะวงศ์)
 หัวหน้าสถานีวิจัยประมงศรีราชา

ใบรับรองผลการตรวจวัดคุณภาพน้ำใต้ดิน



บริษัท ซีคอต จำกัด
SECOT CO., LTD.

239 ถนนริมคลองประปา แขวงบางซื่อ เขตบางซื่อ กรุงเทพมหานคร 10800

239 RIMKLONGPRAPA ROAD, BANGSUE, BANGKOK 10800, THAILAND

TEL. (662) 959-3600 FAX (662) 959-3535 Website : secot.co.th E-mail : envserv@secot.co.th

GROUND WATER ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No	: 0429/67
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Pneumatic Bladder Pump
SAMPLING DATE	: 04, 06/03/2024	SAMPLING TIME	: 09:19-09:33, 11:36-11:40
RECEIVED DATE	: 07/03/2024	ANALYTICAL DATE	: 07-12/03/2024
REPORT DATE	: 16/03/2024	SITE OPERATOR	: Mr. Aniwat Pimwhanna
SAMPLE CONDITION	: Normal	FILE CODE	: 224003_GW_March

PARAMETER	UNIT	ANALYSIS METHODS	ND (non-detectable)	STATION		STANDARD ^{1/}
				MW-101B	MW-102A	
Chromium (Cr)	mg/l	3120 B	< 0.001	ND	ND	≤ 6.0
Manganese (Mn)	mg/l	3120 B	< 0.001	< 0.01	0.02	≤ 33
Mercury (Hg)	mg/l	3112 B	< 0.0001	ND	ND	≤ 0.7
Nickel (Ni)	mg/l	3120 B	< 0.002	ND	ND	≤ 5.0

REFERENCE : STANDARD METHODS FOR EXAMINATION OF WATER AND WASTEWATER 23rd ED. 2017 (AWWA, APHA, WEF)


(Miss Krisana Chanthoom)

Analyst

REG. NO. จ-239-ก-0017


(Mrs. Araya Tipparuk)

Technical Management Team

REG. NO. จ-239-ก-0004

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GROUND WATER ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No. :	0429/67
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Pneumatic Bladder Pump
SAMPLING DATE	: 04, 06/03/2024	SAMPLING TIME	: 09:19-09:33, 11:36-11:40
RECEIVED DATE	: 07/03/2024	ANALYTICAL DATE	: 12-13/03/2024
REPORT DATE	: 16/03/2024	SITE OPERATOR	: Mr. Aniwat Pimwhanna
SAMPLE CONDITION	: Normal	FILE CODE	: 224003_GW_March

PARAMETER	UNIT	ANALYSIS METHODS	ND (non-detectable)	STATION		STANDARD ^{1/}
				MW-101B	MW-102A	
Benzene	mg/l	6200 B	< 0.0002	ND	ND	< 0.2
Ethylbenzene	mg/l	6200 B	< 0.0002	ND	ND	< 2.0
Toluene	mg/l	6200 B	< 0.0002	ND	ND	< 5.0
m-Xylene	mg/l	6200 B	< 0.0002	ND	ND	≤ 24
o-Xylene	mg/l	6200 B	< 0.0002	ND	ND	≤ 24
p-Xylene	mg/l	6200 B	< 0.0002	ND	ND	≤ 24
Total Xylenes	mg/l	6200 B	< 0.0006	ND	ND	≤ 24

REFERENCE: STANDARD METHODS FOR EXAMINATION OF WATER AND WASTEWATER 23rd ED. 2017 (AWWA, APHA, WEF)

Jutarat Jaemruen
(Miss Jutarat Jaemruen)

Analyst

REG. NO. 1-239-1-0022

Araya Tipparuk

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GROUND WATER ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No	: 0429/67
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Pneumatic Bladder Pump
SAMPLING DATE	: 04, 06/03/2024	SAMPLING TIME	: 09:19-09:33, 11:36-11:40
RECEIVED DATE	: 07/03/2024	ANALYTICAL DATE	: 11-13/03/2024
REPORT DATE	: 16/03/2024	SITE OPERATOR	: Mr. Anuwat Pimwhanna
SAMPLE CONDITION	: Normal	FILE CODE	: 224003_GW_March

PARAMETER	UNIT	ANALYSIS	ND	STATION		STANDARD ^{1/}
		METHODS	(non-detectable)	MW-101B	MW-102A	
<u>Total Petroleum Hydrocarbon</u>						
- TPH (C ₅ - C ₈)	mg/l	5030 C/8260 D	< 0.003	ND	ND	≤ 1.4
- Pentane						
- Benzene						
- Toluene						
- m,p-Xylene						
- o-Xylene						
- Ethylbenzene						
- TPH (C ₉ - C ₁₆)	mg/l	3510 C/8015 D	< 0.025	ND	ND	≤ 1.7
- n-Nonane						
- n-Decane						
- n-Dodecane						
- n-Tetradecane						
- n-Hexadecane						
- TPH (C ₁₇ - C ₃₅)	mg/l	3510 C/8015 D	< 0.050	ND	ND	≤ 0.1
- n-Octadecane						
- n-Eicosane						
- n-Docosane						
- n-Tetracosane						
- n-Hexacosane						
- n-Octacosane						
- n-Triacontane						
- n-Dotriacontane						
- n-Tetratriacontane						
- Pentatriacontane						

REFERENCE : STANDARD METHODS FOR EXAMINATION OF WATER AND WASTEWATER 23rd ED. 2017 (AWWA, APHA, WEF)

Sudaporn S.
(Miss Sudaporn Soonthorn)

Analyst

REG. NO. ๓-239-๓-0001

NTL
(Mrs. Araya Tipparuk)

Technical Management Team

REG. NO. ๓-239-๓-0004

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GROUND WATER ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No	: 0429/67
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Pneumatic Bladder Pump
SAMPLING DATE	: 04/03/2024	SAMPLING TIME	: 14:50-14:55, 10:57-11:03
RECEIVED DATE	: 07/03/2024	ANALYTICAL DATE	: 07-12/03/2024
REPORT DATE	: 16/03/2024	SITE OPERATOR	: Mr. Aniwat Piniwhanna
SAMPLE CONDITION	: Normal	FILE CODE	: 224003_GW_March


PARAMETER	UNIT	ANALYSIS METHODS	ND (non-detectable)	STATION		STANDARD ^{1/}
				MW-103A	MW-104A	
Chromium (Cr)	mg/l	3120 B	< 0.001	ND	ND	≤ 6.0
Manganese (Mn)	mg/l	3120 B	< 0.001	< 0.01	0.03	≤ 33
Mercury (Hg)	mg/l	3112 B	< 0.0001	ND	ND	≤ 0.7
Nickel (Ni)	mg/l	3120 B	< 0.002	ND	ND	≤ 5.0

REFERENCE : STANDARD METHODS FOR EXAMINATION OF WATER AND WASTEWATER 21st ED, 2017 (AWWA, APHA, WEF)


(Miss Krisana Chanthoom)

Analyst

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(Mrs. Araya Tipparuk)

Technical Management Team

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GROUND WATER ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No. :	0429/67
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Pneumatic Bladder Pump
SAMPLING DATE	: 04/03/2024	SAMPLING TIME	: 14:50-14:55, 10:57-11:03
RECEIVED DATE	: 07/03/2024	ANALYTICAL DATE	: 12-13/03/2024
REPORT DATE	: 16/03/2024	SITE OPERATOR	: Mr. Aniwat Pimwhanna
SAMPLE CONDITION	: Normal	FILE CODE	: 224003_GW_March

PARAMETER	UNIT	ANALYSIS METHODS	ND (non-detectable)	STATION		STANDARD ^{1/}
				MW-103A	MW-104A	
Benzene	mg/l	6200 B	< 0.0002	ND	ND	< 0.2
Ethylbenzene	mg/l	6200 B	< 0.0002	ND	ND	< 2.0
Toluene	mg/l	6200 B	< 0.0002	ND	ND	< 5.0
m-Xylene	mg/l	6200 B	< 0.0002	ND	ND	≤ 24
o-Xylene	mg/l	6200 B	< 0.0002	ND	ND	≤ 24
p-Xylene	mg/l	6200 B	< 0.0002	ND	ND	≤ 24
Total Xylenes	mg/l	6200 B	< 0.0006	ND	ND	≤ 24

REFERENCE: STANDARD METHODS FOR EXAMINATION OF WATER AND WASTEWATER 23rd ED. 2017 (AWWA, APHA, WEF)

Jutarat Jaemruen

(Miss Jutarat Jaemruen)

Analyst

REG. NO. 3-239-0-0022

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GROUND WATER ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No	: 0429/67
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Pneumatic Bladder Pump
SAMPLING DATE	: 04/03/2024	SAMPLING TIME	: 14:50-14:55, 10:57-11:03
RECEIVED DATE	: 07/03/2024	ANALYTICAL DATE	: 11-13/03/2024
REPORT DATE	: 16/03/2024	SITE OPERATOR	: Mr. Aniwat Pimwhanna
SAMPLE CONDITION	: Normal	FILE CODE	: 224003_GW_March

PARAMETER	UNIT	ANALYSIS	ND	STATION		STANDARD ^{1/}
		METHODS	(non-detectable)	MW-103A	MW-104A	
<u>Total Petroleum Hydrocarbon</u>						
- TPH (C ₅ - C ₈)	mg/l	5030 C/8260 D	< 0.003	0.004	ND	≤ 1.4
- Pentane						
- Benzene						
- Toluene						
- m,p-Xylene						
- o-Xylene						
- Ethylbenzene						
- TPH (C ₉ - C ₁₆)	mg/l	3510 C/8015 D	< 0.025	ND	ND	≤ 1.7
- n-Nonane						
- n-Decane						
- n-Dodecane						
- n-Tetradecane						
- n-Hexadecane						
- TPH (C ₁₇ - C ₃₅)	mg/l	3510 C/8015 D	< 0.050	ND	ND	≤ 0.1
- n-Octadecane						
- n-Eicosane						
- n-Docosane						
- n-Tetracosane						
- n-Hexacosane						
- n-Octacosane						
- n-Triacontane						
- n-Dotriacontane						
- n-Tetratriacontane						
- Pentatriacontane						

REFERENCE: STANDARD METHODS FOR EXAMINATION OF WATER AND WASTEWATER 23rd ED. 2017 (AWWA, APHA, WEF)

Sudaporn S.
(Miss Sudaporn Soonthorn)
Analyst

REG. NO. ๖-239-๓-0001

MT
(Mrs. Araya Tipparuk)
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GROUND WATER ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No	: 0429/67
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Pneumatic Bladder Pump
SAMPLING DATE	: 05/03/2024	SAMPLING TIME	: 10:08-10:15, 10:35-10:57
RECEIVED DATE	: 07/03/2024	ANALYTICAL DATE	: 07-12/03/2024
REPORT DATE	: 16/03/2024	SITE OPERATOR	: Mr. Aniwat Pimwhanna
SAMPLE CONDITION	: Normal	FILE CODE	: 224003_GW_March

PARAMETER	UNIT	ANALYSIS METHODS	ND (non-detectable)	STATION		STANDARD ^{1/}
				MW-105B	MW-106B	
Chromium (Cr)	mg/l	3120 B	< 0.001	ND	ND	≤ 6.0
Manganese (Mn)	mg/l	3120 B	< 0.001	1.61	1.79	≤ 33
Mercury (Hg)	mg/l	3112 B	< 0.0001	ND	ND	≤ 0.7
Nickel (Ni)	mg/l	3120 B	< 0.002	< 0.01	ND	≤ 5.0

REFERENCE: STANDARD METHODS FOR EXAMINATION OF WATER AND WASTEWATER 23rd ED, 2017 (AWWA, APHA, WEF)


(Miss Krisana Chanthoom)

Analyst

REG. NO. ๖-239-๓-0017


(Mrs. Araya Tipparuk)

Technical Management Team

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GROUND WATER ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No.	: 0429/67
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Pneumatic Bladder Pump
SAMPLING DATE	: 05/03/2024	SAMPLING TIME	: 10:08-10:15, 10:35-10:57
RECEIVED DATE	: 07/03/2024	ANALYTICAL DATE	: 12-13/03/2024
REPORT DATE	: 16/03/2024	SITE OPERATOR	: Mr. Aniwat Pimwhanna
SAMPLE CONDITION	: Normal	FILE CODE	: 224003_GW_March

PARAMETER	UNIT	ANALYSIS METHODS	ND (non-detectable)	STATION		STANDARD ^{1/}
				MW-105B	MW-106B	
Benzene	mg/l	6200 B	< 0.0002	ND	ND	< 0.2
Ethylbenzene	mg/l	6200 B	< 0.0002	ND	ND	< 2.0
Toluene	mg/l	6200 B	< 0.0002	ND	ND	< 5.0
m-Xylene	mg/l	6200 B	< 0.0002	ND	ND	≤ 24
o-Xylene	mg/l	6200 B	< 0.0002	ND	ND	≤ 24
p-Xylene	mg/l	6200 B	< 0.0002	ND	ND	≤ 24
Total Xylenes	mg/l	6200 B	< 0.0006	ND	ND	≤ 24

REFERENCE : STANDARD METHODS FOR EXAMINATION OF WATER AND WASTEWATER 23RD ED. 2017 (AWWA, APHA, WEF)

Jutarat Jaemruen
(Miss Jutarat Jaemruen)

Analyst

REG. NO. ๖-239-๖-0022

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Technical Management Team

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REPORT DATE	: 16/03/2024	SITE OPERATOR	: Mr. Aniwat Pimwhanna
SAMPLE CONDITION	: Normal	FILE CODE	: 224003_GW_March

PARAMETER	UNIT	ANALYSIS	ND	STATION		STANDARD ^{1/}
		METHODS	(non-detectable)	MW-105B	MW-106B	
<u>Total Petroleum Hydrocarbon</u>						
- TPH (C ₅ - C ₁₆)	mg/l	5030 C/8260 D	< 0.003	ND	ND	≤ 1.4
- Pentane						
- Benzene						
- Toluene						
- m,p-Xylene						
- o-Xylene						
- Ethylbenzene						
- TPH (C _{>8} - C ₁₆)	mg/l	3510 C/8015 D	< 0.025	ND	ND	≤ 1.7
- n-Nonane						
- n-Decane						
- n-Dodecane						
- n-Tetradecane						
- n-Hexadecane						
- TPH (C _{>16} - C ₃₅)	mg/l	3510 C/8015 D	< 0.050	ND	ND	≤ 0.1
- n-Octadecane						
- n-Eicosane						
- n-Docosane						
- n-Tetracosane						
- n-Hexacosane						
- n-Octacosane						
- n-Triacontane						
- n-Dotriacontane						
- n-Tetratriacontane						
- Pentatriacontane						

REFERENCE : STANDARD METHODS FOR EXAMINATION OF WATER AND WASTEWATER 23rd ED. 2017 (AWWA APHA, WEF)

Sudaporn S.
(Miss Sudaporn Soonthorn)

Analyst

REG. NO. 3-239-ก-0001

Araya Tipparuk

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Technical Management Team

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GROUND WATER ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No	: 0429/67
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Pneumatic Bladder Pump
SAMPLING DATE	: 05-06/03/2024	SAMPLING TIME	: 14:52-15:10, 15:01-15:14
RECEIVED DATE	: 07/03/2024	ANALYTICAL DATE	: 07-12/03/2024
REPORT DATE	: 16/03/2024	SITE OPERATOR	: Mr. Aniwat Pimwhanna
SAMPLE CONDITION	: Normal	FILE CODE	: 224003_GW_March

PARAMETER	UNIT	ANALYSIS METHODS	ND (non-detectable)	STATION		STANDARD ¹⁾
				MW-107C	MW-108B	
Chromium (Cr)	mg/l	3120 B	< 0.001	< 0.01	ND	≤ 6.0
Manganese (Mn)	mg/l	3120 B	< 0.001	2.04	0.17	≤ 33
Mercury (Hg)	mg/l	3112 B	< 0.0001	ND	ND	≤ 0.7
Nickel (Ni)	mg/l	3120 B	< 0.002	< 0.01	ND	≤ 5.0

REFERENCE : STANDARD METHODS FOR EXAMINATION OF WATER AND WASTEWATER 23rd ED. 2017 (AWWA, APHA, WEF)


(Miss Krisana Chanthoom)

Analyst

REG. NO. 7-239-ท-0017


(Mrs. Araya Tipparuk)

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REG. NO. 7-239-ท-0004

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GROUND WATER ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No. :	0429/67
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Pneumatic Bladder Pump
SAMPLING DATE	: 05-06/03/2024	SAMPLING TIME	: 14:52-15:10, 15:01-15:14
RECEIVED DATE	: 07/03/2024	ANALYTICAL DATE	: 12-13/03/2024
REPORT DATE	: 16/03/2024	SITE OPERATOR	: Mr. Aniwat Pimwhanna
SAMPLE CONDITION	: Normal	FILE CODE	: 224003_GW_March

PARAMETER	UNIT	ANALYSIS	ND	STATION		STANDARD ^{1/}
		METHODS	(non-detectable)	MW-107C	MW-108B	
Benzene	mg/l	6200 B	< 0.0002	ND	ND	< 0.2
Ethylbenzene	mg/l	6200 B	< 0.0002	ND	ND	< 2.0
Toluene	mg/l	6200 B	< 0.0002	ND	ND	< 5.0
m-Xylene	mg/l	6200 B	< 0.0002	ND	ND	≤ 24
o-Xylene	mg/l	6200 B	< 0.0002	ND	ND	≤ 24
p-Xylene	mg/l	6200 B	< 0.0002	ND	ND	≤ 24
Total Xylenes	mg/l	6200 B	< 0.0006	ND	ND	≤ 24

REFERENCE: STANDARD METHODS FOR EXAMINATION OF WATER AND WASTEWATER 23rd ED., 2017 (AWWA, APHA, WEF)

Jutarat Jaemruen
(Miss Jutarat Jaemruen)

Analyst

REG. NO. จ-239-ก-0022

Araya Tipparuk
(Mrs. Araya Tipparuk)

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TEL. (662) 959-3600 FAX (662) 959-3535 Website: secot.co.th E-mail: envserv@secot.co.th

GROUND WATER ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No	: 0429/67
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Pneumatic Bladder Pump
SAMPLING DATE	: 05-06/03/2024	SAMPLING TIME	: 14:52-15:10, 15:01-15:14
RECEIVED DATE	: 07/03/2024	ANALYTICAL DATE	: 11-13/03/2024
REPORT DATE	: 16/03/2024	SITE OPERATOR	: Mr. Aniwat Pimwhanna
SAMPLE CONDITION	: Normal	FILE CODE	: 224003_GW_March

PARAMETER	UNIT	ANALYSIS	ND	STATION		STANDARD ^{1/}
		METHODS	(non-detectable)	MW-107C	MW-108B	
<u>Total Petroleum Hydrocarbon</u>						
- TPH (C ₅ - C ₈)	mg/l	5030 C/8260 D	< 0.003	ND	ND	≤ 1.4
- Pentane						
- Benzene						
- Toluene						
- m,p-Xylene						
- o-Xylene						
- Ethylbenzene						
- TPH (C ₉ - C ₁₆)	mg/l	3510 C/8015 D	< 0.025	ND	ND	≤ 1.7
- n-Nonane						
- n-Decane						
- n-Dodecane						
- n-Tetradecane						
- n-Hexadecane						
- TPH (C ₁₇ - C ₃₅)	mg/l	3510 C/8015 D	< 0.050	ND	ND	≤ 0.1
- n-Octadecane						
- n-Eicosane						
- n-Docosane						
- n-Tetracosane						
- n-Hexacosane						
- n-Octacosane						
- n-Triacontane						
- n-Dotriacontane						
- n-Tetratriacontane						
- Pentatriacontane						

REFERENCE: STANDARD METHODS FOR EXAMINATION OF WATER AND WASTEWATER 21ST ED. 2017 (AWWA, APHA, WEF)

Sudaporn S.
(Miss Sudaporn Soonthorn)

Analyst

REG. NO. ๓-239-๓-0001

(Mrs. Araya Tipparuk)

Technical Management Team

REG. NO. ๓-239-๓-0004

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GROUND WATER ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No	: 0429/67, 0453/67
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Pneumatic Bladder Pump
SAMPLING DATE	: 06, 08/03/2024	SAMPLING TIME	: 09:49-10:00, 10:21-10:30
RECEIVED DATE	: 07, 09/03/2024	ANALYTICAL DATE	: 07-14/03/2024
REPORT DATE	: 16/03/2024	SITE OPERATOR	: Mr. Aniwat Pinwhanna
SAMPLE CONDITION	: Normal	FILE CODE	: 224003_GW_March

PARAMETER	UNIT	ANALYSIS METHODS	ND (non-detectable)	STATION		STANDARD ^{1/}
				MW-109A	MW-111A	
Chromium (Cr)	mg/l	3120 B	< 0.001	< 0.01	ND	≤ 6.0
Manganese (Mn)	mg/l	3120 B	< 0.001	0.84	0.05	≤ 33
Mercury (Hg)	mg/l	3112 B	< 0.0001	ND	ND	≤ 0.7
Nickel (Ni)	mg/l	3120 B	< 0.002	< 0.01	ND	≤ 5.0

REFERENCE: STANDARD METHODS FOR EXAMINATION OF WATER AND WASTEWATER 23rd ED. 2017 (AWWA, APHA, WEF)


(Miss Krisana Chanthoom)

Analyst

REG. NO. ๖-239-๖-0017



(Mrs. Araya Tipparuk)

Technical Management Team

REG. NO. ๖-239-ก-0004

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GROUND WATER ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No.	: 0429/67, 0453/67
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Pneumatic Bladder Pump
SAMPLING DATE	: 06, 08/03/2024	SAMPLING TIME	: 09:49-10:00, 10:21-10:30
RECEIVED DATE	: 07, 09/03/2024	ANALYTICAL DATE	: 12-13/03/2024
REPORT DATE	: 16/03/2024	SITE OPERATOR	: Mr. Aniwat Pimwhanna
SAMPLE CONDITION	: Normal	FILE CODE	: 224003_GW_March

PARAMETER	UNIT	ANALYSIS	ND	STATION		STANDARD ^{1/}
		METHODS	(non-detectable)	MW-109A	MW-111A	
Benzene	mg/l	6200 B	< 0.0002	ND	ND	< 0.2
Ethylbenzene	mg/l	6200 B	< 0.0002	ND	ND	< 2.0
Toluene	mg/l	6200 B	< 0.0002	ND	ND	< 5.0
m-Xylene	mg/l	6200 B	< 0.0002	ND	ND	≤ 24
o-Xylene	mg/l	6200 B	< 0.0002	ND	ND	≤ 24
p-Xylene	mg/l	6200 B	< 0.0002	ND	ND	≤ 24
Total Xylenes	mg/l	6200 B	< 0.0006	ND	ND	≤ 24

REFERENCE: STANDARD METHODS FOR EXAMINATION OF WATER AND WASTEWATER 21st ED. 2017 (AWWA, APHA, WEF)

Jutarat Jaemruen
(Miss Jutarat Jaemruen)

Analyst

REG. NO. ๓-239-๓-0022

Araya Tipparuk
(Mrs. Araya Tipparuk)

Technical Management Team

REG. NO. ๓-239-๓-0004

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GROUND WATER ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No	: 0429/67, 0453/67
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Pneumatic Bladder Pump
SAMPLING DATE	: 06, 08/03/2024	SAMPLING TIME	: 09:49-10:00, 10:21-10:30
RECEIVED DATE	: 07, 09/03/2024	ANALYTICAL DATE	: 11-13/03/2024
REPORT DATE	: 16/03/2024	SITE OPERATOR	: Mr. Aniwat Pimwhanna
SAMPLE CONDITION	: Normal	FILE CODE	: 224003_GW_March

PARAMETER	UNIT	ANALYSIS METHODS	ND (non-detectable)	STATION		STANDARD ^{1/}
				MW-109A	MW-111A	
<u>Total Petroleum Hydrocarbon</u>						
- TPH (C ₃ - C ₈)	mg/l	5030 C/8260 D	< 0.003	ND	ND	≤ 1.4
- Pentane						
- Benzene						
- Toluene						
- m,p-Xylene						
- o-Xylene						
- Ethylbenzene						
- TPH (C ₈ - C ₁₆)	mg/l	3510 C/8015 D	< 0.025	ND	ND	≤ 1.7
- n-Nonane						
- n-Decane						
- n-Dodecane						
- n-Tetradecane						
- n-Hexadecane						
- TPH (C ₁₆ - C ₃₅)	mg/l	3510 C/8015 D	< 0.050	ND	ND	≤ 0.1
- n-Octadecane						
- n-Eicosane						
- n-Docosane						
- n-Tetracosane						
- n-Hexacosane						
- n-Octacosane						
- n-Triacontane						
- n-Dotriacontane						
- n-Tetratriacontane						
- Pentatriacontane						

REFERENCE : STANDARD METHODS FOR EXAMINATION OF WATER AND WASTEWATER 23rd ED. 2017 (AWWA, APHA, WEF)

Sudaporn S.
(Miss Sudaporn Soonthorn)
Analyst

REG. NO. 3-239-ก-0001

NTL
(Mrs. Araya Tipparuk)
Technical Management Team
REG. NO. 3-239-ก-0004

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GROUND WATER ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No	: 0429/67
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Pneumatic Bladder Pump
SAMPLING DATE	: 06/03/2024	SAMPLING TIME	: 09:56-10:00, 10:49-10:58
RECEIVED DATE	: 07/03/2024	ANALYTICAL DATE	: 07-12/03/2024
REPORT DATE	: 16/03/2024	SITE OPERATOR	: Mr. Aniwat Pimwhanna
SAMPLE CONDITION	: Normal	FILE CODE	: 224003_GW_March

PARAMETER	UNIT	ANALYSIS METHODS	ND (non-detectable)	STATION		STANDARD ^{1/}
				MW-112A.	MW-113A	
Chromium (Cr)	mg/l	3120 B	< 0.001	ND	< 0.01	≤ 6.0
Manganese (Mn)	mg/l	3120 B	< 0.001	0.03	0.02	≤ 33
Mercury (Hg)	mg/l	3112 B	< 0.0001	ND	ND	≤ 0.7
Nickel (Ni)	mg/l	3120 B	< 0.002	ND	ND	≤ 5.0

REFERENCE: STANDARD METHODS FOR EXAMINATION OF WATER AND WASTEWATER 23rd ED. 2017 (AWWA, APHA, WEF)

(Miss Krisana Chanthoom)

Analyst

REG. NO. 7-239-0-0017

(Mrs. Araya Tipparuk)

Technical Management Team

REG. NO. 7-239-0-0004

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GROUND WATER ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No.	: 0429/67
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Pneumatic Bladder Pump
SAMPLING DATE	: 06/03/2024	SAMPLING TIME	: 09:56-10:00, 10:49-10:58
RECEIVED DATE	: 07/03/2024	ANALYTICAL DATE	: 12-13/03/2024
REPORT DATE	: 16/03/2024	SITE OPERATOR	: Mr. Aniwat Pimwhanna
SAMPLE CONDITION	: Normal	FILE CODE	: 224003_GW_March

PARAMETER	UNIT	ANALYSIS METHODS	ND (non-detectable)	STATION		STANDARD ^{1/}
				MW-112A	MW-113A	
Benzene	mg/l	6200 B	< 0.0002	ND	ND	< 0.2
Ethylbenzene	mg/l	6200 B	< 0.0002	ND	ND	< 2.0
Toluene	mg/l	6200 B	< 0.0002	ND	ND	< 5.0
m-Xylene	mg/l	6200 B	< 0.0002	ND	ND	≤ 24
o-Xylene	mg/l	6200 B	< 0.0002	ND	ND	≤ 24
p-Xylene	mg/l	6200 B	< 0.0002	ND	ND	≤ 24
Total Xylenes	mg/l	6200 B	< 0.0006	ND	ND	≤ 24

REFERENCE : STANDARD METHODS FOR EXAMINATION OF WATER AND WASTEWATER 23rd ED., 2017 (AWWA, APHA, WEF)

Jutarat Jaemruen

(Miss Jutarat Jaemruen)

Analyst

REG. NO. 7-239-ก-0022

Araya Tipparuk

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Technical Management Team

REG. NO. 7-239-ก-0004

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GROUND WATER ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No	: 0429/67
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Pneumatic Bladder Pump
SAMPLING DATE	: 06/03/2024	SAMPLING TIME	: 09:56-10:00, 10:49-10:58
RECEIVED DATE	: 07/03/2024	ANALYTICAL DATE	: 11-13/03/2024
REPORT DATE	: 16/03/2024	SITE OPERATOR	: Mr. Aniwat Pimwhanna
SAMPLE CONDITION	: Normal	FILE CODE	: 224003_GW_March

PARAMETER	UNIT	ANALYSIS	ND	STATION		STANDARD ^{1/}
		METHODS	(non-detectable)	MW-112A	MW-113A	
<u>Total Petroleum Hydrocarbon</u>						
- TPH (C ₅ - C ₈)	mg/l	5030 C/8260 D	< 0.003	ND	ND	≤ 1.4
- Pentane						
- Benzene						
- Toluene						
- m,p-Xylene						
- o-Xylene						
- Ethylbenzene						
- TPH (C ₉ - C ₁₆)	mg/l	3510 C/8015 D	< 0.025	ND	ND	≤ 1.7
- n-Nonane						
- n-Decane						
- n-Dodecane						
- n-Tetradecane						
- n-Hexadecane						
- TPH (C ₁₇ - C ₃₅)	mg/l	3510 C/8015 D	< 0.050	ND	ND	≤ 0.1
- n-Octadecane						
- n-Eicosane						
- n-Docosane						
- n-Tetracosane						
- n-Hexacosane						
- n-Octacosane						
- n-Triacontane						
- n-Dotriacontane						
- n-Tetratriacontane						
- Pentatriacontane						

REFERENCE: STANDARD METHODS FOR EXAMINATION OF WATER AND WASTEWATER 23rd ED. 2017 (AWWA, APHA, WEF)

Sudaporn S.
(Miss Sudaporn Soonthorn)
Analyst

REG. NO. 7-239-ท-0001

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(Mrs. Araya Tipparuk)
Technical Management Team
REG. NO. 7-239-ท-0004

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GROUND WATER ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No	: 0429/67, 0453/67
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Pneumatic Bladder Pump
SAMPLING DATE	: 05, 08/03/2024	SAMPLING TIME	: 09:19-09:25, 09:33-09:38
RECEIVED DATE	: 07, 09/03/2024	ANALYTICAL DATE	: 07-14/03/2024
REPORT DATE	: 16/03/2024	SITE OPERATOR	: Mr. Aniwat Pimwhanna
SAMPLE CONDITION	: Normal	FILE CODE	: 224003_GW_March

PARAMETER	UNIT	ANALYSIS METHODS	ND (non-detectable)	STATION		STANDARD ^U
				MW-114A	MW-115A	
Chromium (Cr)	mg/l	3120 B	< 0.001	ND	< 0.01	≤ 6.0
Manganese (Mn)	mg/l	3120 B	< 0.001	0.05	0.16	≤ 33
Mercury (Hg)	mg/l	3112 B	< 0.0001	ND	ND	≤ 0.7
Nickel (Ni)	mg/l	3120 B	< 0.002	ND	< 0.01	≤ 5.0

REFERENCE : STANDARD METHODS FOR EXAMINATION OF WATER AND WASTEWATER 23rd ED. 2017 (AWWA, APHA, WEF)


(Miss Krisana Chanthoom)

Analyst

REG. NO. 3-239-0-0017


(Mrs. Araya Tipparuk)

Technical Management Team

REG. NO. 3-239-0-0004

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GROUND WATER ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No.	: 0429/67, 0453/67
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Pneumatic Bladder Pump
SAMPLING DATE	: 05, 08/03/2024	SAMPLING TIME	: 09:19-09:25, 09:33-09:38
RECEIVED DATE	: 07, 09/03/2024	ANALYTICAL DATE	: 12-13/03/2024
REPORT DATE	: 16/03/2024	SITE OPERATOR	: Mr. Aniwat Pimwhanna
SAMPLE CONDITION	: Normal	FILE CODE	: 224003_GW_March

PARAMETER	UNIT	ANALYSIS METHODS	ND (non-detectable)	STATION		STANDARD ^{1/}
				MW-114A	MW-115A	
Benzene	mg/l	6200 B	< 0.0002	ND	ND	< 0.2
Ethylbenzene	mg/l	6200 B	< 0.0002	ND	ND	< 2.0
Toluene	mg/l	6200 B	< 0.0002	ND	ND	< 5.0
m-Xylene	mg/l	6200 B	< 0.0002	ND	ND	≤ 24
o-Xylene	mg/l	6200 B	< 0.0002	ND	ND	≤ 24
p-Xylene	mg/l	6200 B	< 0.0002	ND	ND	≤ 24
Total Xylenes	mg/l	6200 B	< 0.0006	ND	ND	≤ 24

REFERENCE : STANDARD METHODS FOR EXAMINATION OF WATER AND WASTEWATER 23rd ED. 2017 (AWWA, APHA, WEF)

Jutarat Jaemruen
(Miss Jutarat Jaemruen)

Analyst

REG. NO. ว-239-ท-0022

(Mrs. Araya Tipparuk)

Technical Management Team

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GROUND WATER ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No	: 0429/67, 0453/67
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Pneumatic Bladder Pump
SAMPLING DATE	: 05, 08/03/2024	SAMPLING TIME	: 09:19-09:25, 09:33-09:38
RECEIVED DATE	: 07, 09/03/2024	ANALYTICAL DATE	: 11-13/03/2024
REPORT DATE	: 16/03/2024	SITE OPERATOR	: Mr. Aniwat Pimwhanna
SAMPLE CONDITION	: Normal	FILE CODE	: 224003_GW_March

PARAMETER	UNIT	ANALYSIS	ND	STATION		STANDARD ^{1/}
		METHODS	(non-detectable)	MW-114A	MW-115A	
<u>Total Petroleum Hydrocarbon</u>						
- TPH (C ₅ - C ₈)	mg/l	5030 C/8260 D	< 0.003	ND	ND	≤ 1.4
- Pentane						
- Benzene						
- Toluene						
- m,p-Xylene						
- o-Xylene						
- Ethylbenzene						
- TPH (C _{> 8} - C ₁₆)	mg/l	3510 C/8015 D	< 0.025	ND	ND	≤ 1.7
- n-Nonane						
- n-Decane						
- n-Dodecane						
- n-Tetradecane						
- n-Hexadecane						
- TPH (C _{> 16} - C ₃₅)	mg/l	3510 C/8015 D	< 0.050	ND	ND	≤ 0.1
- n-Octadecane						
- n-Eicosane						
- n-Docosane						
- n-Tetracosane						
- n-Hexacosane						
- n-Octacosane						
- n-Triacontane						
- n-Dotriacontane						
- n-Tetratriacontane						
- Pentatriacontane						

REFERENCE : STANDARD METHODS FOR EXAMINATION OF WATER AND WASTEWATER 21st ED. 2017 (AWWA, APHA, WEP)

Sudaporn S.
(Miss Sudaporn Soonthorn)

Analyst

REG. NO. 7-239-ท-0001

(Mrs. Araya Tipparuk)

Technical Management Team

REG. NO. 7-239-ท-0004

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SOIL SAMPLES ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No.	: 0585/67
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Hand Auger
SAMPLING DATE	: 25-26/03/2024	SAMPLING TIME	: 09:41-09:53, 10:15-10:27
RECEIVED DATE	: 27/03/2024	ANALYTICAL DATE	: 27-28/03/2024, 04-06/04/2024
REPORT DATE	: 17/04/2024	SITE OPERATOR	: Mr. Baworn Deechaiya
SAMPLE CONDITION	: Normal	FILE CODE	: 224003_Soil_March

PARAMETER	UNIT	ANALYSIS METHODS	ND (non-detectable)	STATION		STANDARD ^{1/}
				MW-101 B	MW-102 A	
Naphthalene	mg/kg	3540 C / 8270 E	< 0.005	ND	ND	≤ 1,000
Hexane	mg/kg	5035 A / 8260 D	< 0.001	ND	ND	≤ 1,000
Benzene	mg/kg	5035 A / 8260 D	< 0.00025	ND	ND	≤ 15
Toluene	mg/kg	5035 A / 8260 D	< 0.00025	ND	ND	≤ 520
m-Xylene	mg/kg	5035 A / 8260 D	< 0.00025	ND	ND	≤ 210
o-Xylene	mg/kg	5035 A / 8260 D	< 0.00025	ND	ND	≤ 210
p-Xylene	mg/kg	5035 A / 8260 D	< 0.00025	ND	ND	≤ 210
Total Xylenes	mg/kg	5035 A / 8260 D	< 0.00075	ND	ND	≤ 210

REFERENCE : US EPA SW 846 TEST METHODS FOR EVALUATING WATER AND SOLID WASTE, 3rd ED., 2020

Jutarat Jaemruen

(Miss Jutarat Jaemruen)

Analyst

REG. NO. ๖-239-๖-0022

Araya Tipparuk

(Mrs. Araya Tipparuk)

Technical Management Team

REG. NO. ๖-239-๖-0004

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SOIL SAMPLES ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No.	: 0585/67
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Hand Auger
SAMPLING DATE	: 26/03/2024	SAMPLING TIME	: 10:34-10:47, 10:55-11:09
RECEIVED DATE	: 27/03/2024	ANALYTICAL DATE	: 27-28/03/2024, 04-06/04/2024
REPORT DATE	: 17/04/2024	SITE OPERATOR	: Mr. Baworn Deechaiya
SAMPLE CONDITION	: Normal	FILE CODE	: 224003_Soil_March

PARAMETER	UNIT	ANALYSIS METHODS	ND (non-detectable)	STATION		STANDARD ^{1/}
				MW-103 A	MW-104 A	
Naphthalene	mg/kg	3540 C / 8270 E	< 0.005	ND	ND	≤ 1,000
Hexane	mg/kg	5035 A / 8260 D	< 0.001	ND	ND	≤ 1,000
Benzene	mg/kg	5035 A / 8260 D	< 0.00025	ND	ND	≤ 15
Toluene	mg/kg	5035 A / 8260 D	< 0.00025	ND	ND	≤ 520
m-Xylene	mg/kg	5035 A / 8260 D	< 0.00025	ND	ND	≤ 210
o-Xylene	mg/kg	5035 A / 8260 D	< 0.00025	ND	ND	≤ 210
p-Xylene	mg/kg	5035 A / 8260 D	< 0.00025	ND	ND	≤ 210
Total Xylenes	mg/kg	5035 A / 8260 D	< 0.00075	ND	ND	≤ 210

REFERENCE : US EPA SW 846 TEST METHODS FOR EVALUATING WATER AND SOLID WASTE, 3rd ED., 2020

Jutarat Jaemruen

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MR

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SOIL SAMPLES ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No.	: 0585/67
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Hand Auger
SAMPLING DATE	: 26/03/2024	SAMPLING TIME	: 09:10-09:24, 09:31-09:43
RECEIVED DATE	: 27/03/2024	ANALYTICAL DATE	: 27-28/03/2024, 04-06/04/2024
REPORT DATE	: 17/04/2024	SITE OPERATOR	: Mr. Baworn Deechaiya
SAMPLE CONDITION	: Normal	FILE CODE	: 224003_Soil_March

PARAMETER	UNIT	ANALYSIS METHODS	ND (non-detectable)	STATION		STANDARD ^{1/}
				MW-105 B	MW-106 B	
Naphthalene	mg/kg	3540 C / 8270 E	< 0.005	ND	ND	≤ 1,000
Hexane	mg/kg	5035 A / 8260 D	< 0.001	ND	ND	≤ 1,000
Benzene	mg/kg	5035 A / 8260 D	< 0.00025	ND	ND	≤ 15
Toluene	mg/kg	5035 A / 8260 D	< 0.00025	ND	ND	≤ 520
m-Xylene	mg/kg	5035 A / 8260 D	< 0.00025	ND	ND	≤ 210
o-Xylene	mg/kg	5035 A / 8260 D	< 0.00025	ND	ND	≤ 210
p-Xylene	mg/kg	5035 A / 8260 D	< 0.00025	ND	ND	≤ 210
Total Xylenes	mg/kg	5035 A / 8260 D	< 0.00075	ND	ND	≤ 210

REFERENCE : US EPA SW-846 TEST METHODS FOR EVALUATING WATER AND SOLID WASTE, 1st ED., 2020

Jutarat Jaemruen

(Miss Jutarat Jaemruen)

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REG. NO. 1-239-1-0022

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SOIL SAMPLES ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No.	: 0585/67
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Hand Auger
SAMPLING DATE	: 25-26/03/2024	SAMPLING TIME	: 09:50-10:03, 11:03-11:18
RECEIVED DATE	: 27/03/2024	ANALYTICAL DATE	: 27-28/03/2024, 04-06/04/2024
REPORT DATE	: 17/04/2024	SITE OPERATOR	: Mr. Baworn Deechaiya
SAMPLE CONDITION	: Normal	FILE CODE	: 224003_Soil_March

PARAMETER	UNIT	ANALYSIS METHODS	ND (non-detectable)	STATION		STANDARD ^{1/}
				MW-108 B	MW-109 A	
Naphthalene	mg/kg	3540 C / 8270 E	< 0.005	ND	ND	≤ 1,000
Hexane	mg/kg	5035 A / 8260 D	< 0.001	ND	ND	≤ 1,000
Benzene	mg/kg	5035 A / 8260 D	< 0.00025	ND	ND	≤ 15
Toluene	mg/kg	5035 A / 8260 D	< 0.00025	ND	ND	≤ 520
m-Xylene	mg/kg	5035 A / 8260 D	< 0.00025	ND	ND	≤ 210
o-Xylene	mg/kg	5035 A / 8260 D	< 0.00025	ND	ND	≤ 210
p-Xylene	mg/kg	5035 A / 8260 D	< 0.00025	ND	ND	≤ 210
Total Xylenes	mg/kg	5035 A / 8260 D	< 0.00075	ND	ND	≤ 210

REFERENCE : U.S.EPA SW 846 TEST METHODS FOR EVALUATING WATER AND SOLID WASTE, 3RD ED., 2020

Jutarat Jaemruen

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Analyst

REG. NO. ๖-239-๓-0022

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Technical Management Team

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SOIL SAMPLES ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No.	: 0585/67
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Hand Auger
SAMPLING DATE	: 25/03/2024	SAMPLING TIME	: 11:03-11:18, 10:22-10:32
RECEIVED DATE	: 27/03/2024	ANALYTICAL DATE	: 27-28/03/2024, 04-06/04/2024
REPORT DATE	: 17/04/2024	SITE OPERATOR	: Mr. Baworn Deechaiya
SAMPLE CONDITION	: Normal	FILE CODE	: 224003_Soil_March

PARAMETER	UNIT	ANALYSIS METHODS	ND (non-detectable)	STATION		STANDARD ^{1/}
				MW-112 A	MW-113 A	
Naphthalene	mg/kg	3540 C / 8270 E	< 0.005	ND	ND	≤ 1,000
Hexane	mg/kg	5035 A / 8260 D	< 0.001	ND	ND	≤ 1,000
Benzene	mg/kg	5035 A / 8260 D	< 0.00025	ND	ND	≤ 15
Toluene	mg/kg	5035 A / 8260 D	< 0.00025	ND	ND	≤ 520
m-Xylene	mg/kg	5035 A / 8260 D	< 0.00025	ND	ND	≤ 210
o-Xylene	mg/kg	5035 A / 8260 D	< 0.00025	ND	ND	≤ 210
p-Xylene	mg/kg	5035 A / 8260 D	< 0.00025	ND	ND	≤ 210
Total Xylenes	mg/kg	5035 A / 8260 D	< 0.00075	ND	ND	≤ 210

REFERENCE : US EPA SW 846 TEST METHODS FOR EVALUATING WATER AND SOLID WASTE, 3rd ED., 2020

Jutarat Jaemruen
(Miss Jutarat Jaemruen)

Analyst

REG. NO. 3-239-3-0022

(Mrs. Araya Tipparuk)

Technical Management Team

REG. NO. 3-239-3-0004

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SOIL SAMPLES ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No.	: 0794/67
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Hand Auger
SAMPLING DATE	: 23-24/04/2024	SAMPLING TIME	: 14:18-14:39, 14:37-14:50
RECEIVED DATE	: 25/04/2024	ANALYTICAL DATE	: 29/04/2024-12/05/2024
REPORT DATE	: 14/05/2024	SITE OPERATOR	: Mr. Aniwai Pimwanna
SAMPLE CONDITION	: Normal	FILE CODE	: 224003_Soil_April

PARAMETER	UNIT	ANALYSIS	ND	STATION		STANDARD ^{1/}
		METHODS	(non-detectable)	MW-101 B	MW-102 A	
<u>Total Petroleum Hydrocarbons</u>						
- TPH (C ₅ - C ₈)	mg/kg	5035A /8260 D	< 0.003	ND	ND	≤ 25
- Pentane						
- Benzene						
- Toluene						
- m,p-Xylene						
- o-Xylene						
- Ethylbenzene						
- TPH (C ₉ - C ₁₆)	mg/kg	3540C/8015 D	< 0.25	ND	ND	≤ 25
- n-Nonane						
- n-Decane						
- n-Dodecane						
- n-Tetradecane						
- n-Hexadecane						
- TPH (C ₁₇ - C ₃₅)	mg/kg	3540C/8015 D	< 1.85	ND	6.99	≤ 8
- n-Octadecane						
- n-Eicosane						
- n-Docosane						
- n-Tetracosane						
- n-Hexacosane						
- n-Octacosane						
- n-Triacontane						
- n-Dotriacontane						
- n-Tetratriacontane						
- Pentatriacontane						

REFERENCE : US EPA SW 846 TEST METHODS FOR EVALUATING WATER AND SOLID WASTE, 1st ED., 2020

Sudaporn S.

(Miss Sudaporn Soonthorn)

Analyst

REG. NO. 2-239-ก-0001

Araya

(Mrs. Araya Tipparuk)

Technical Management Team

REG. NO. 2-239-ก-0004

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SOIL SAMPLES ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No.	: 0585/67
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Hand Auger
SAMPLING DATE	: 26/03/2024	SAMPLING TIME	: 10:34-10:47
RECEIVED DATE	: 27/03/2024	ANALYTICAL DATE	: 27/03/2024-04/04/2024
REPORT DATE	: 17/04/2024	SITE OPERATOR	: Mr. Baworn Deechaiya
SAMPLE CONDITION	: Normal	FILE CODE	: 224003_Soil_March

PARAMETER	UNIT	ANALYSIS METHODS	ND (non-detectable)	STATION MW-103 A	STANDARD ^{1/}
<u>Total Petroleum Hydrocarbons</u>					
- TPH (C ₅ - C ₈)	mg/kg	5035A /8260 D	< 0.003	ND	≤ 25
- Pentane	mg/kg				
- Benzene	mg/kg				
- Toluene	mg/kg				
- m,p-Xylene	mg/kg				
- o-Xylene	mg/kg				
- Ethylbenzene	mg/kg				
- TPH (C ₉ - C ₁₆)	mg/kg	3540C/8015 D	< 0.25	ND	≤ 25
- n-Nonane	mg/kg				
- n-Decane	mg/kg				
- n-Dodecane	mg/kg				
- n-Tetradecane	mg/kg				
- n-Hexadecane	mg/kg				
- TPH (C ₁₇ - C ₃₅)	mg/kg	3540C/8015 D	< 1.85	ND	≤ 8
- n-Octadecane	mg/kg				
- n-Eicosane	mg/kg				
- n-Docosane	mg/kg				
- n-Tetracosane	mg/kg				
- n-Hexacosane	mg/kg				
- n-Octacosane	mg/kg				
- n-Triacontane	mg/kg				
- n-Dotriacontane	mg/kg				
- n-Tetratriacontane	mg/kg				
- Pentatriacontane	mg/kg				

REFERENCE : US EPA SW-846 TEST METHODS FOR EVALUATING WATER AND SOLID WASTE, 1st ED., 2020.

Sudaporn S.
(Miss Sudaporn Soonthorn)

Analyst

REG. NO. ๖-239-๖-0001

(Mrs. Araya Tipparuk)

Technical Management Team

REG. NO. ๖-239-๖-0004

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SOIL SAMPLES ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No.	: 0794/67
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Hand Auger
SAMPLING DATE	: 24/04/2024	SAMPLING TIME	: 13:52-14:10, 10:24-11:00
RECEIVED DATE	: 25/04/2024	ANALYTICAL DATE	: 29/04/2024-12/05/2024
REPORT DATE	: 14/05/2024	SITE OPERATOR	: Mr. Aniwat Pimwanna
SAMPLE CONDITION	: Normal	FILE CODE	: 224003_Soil_April

PARAMETER	UNIT	ANALYSIS METHODS	ND (non-detectable)	STATION		STANDARD ^U
				MW-104 A	MW-105 B	
Total Petroleum Hydrocarbons						
- TPH (C ₅ - C ₆)	mg/kg	5035A /8260 D	< 0.003	ND	ND	≤ 25
- Pentane						
- Benzene						
- Toluene						
- m,p-Xylene						
- o-Xylene						
- Ethylbenzene						
- TPH (C ₈ - C ₁₆)	mg/kg	3540C/8015 D	< 0.25	ND	0.66	≤ 25
- n-Nonane						
- n-Decane						
- n-Dodecane						
- n-Tetradecane						
- n-Hexadecane						
- TPH (C ₁₆ - C ₃₅)	mg/kg	3540C/8015 D	< 1.85	ND	ND	≤ 8
- n-Octadecane						
- n-Eicosane						
- n-Docosane						
- n-Tetracosane						
- n-Hexacosane						
- n-Octacosane						
- n-Triacontane						
- n-Dotriacontane						
- n-Tetratriacontane						
- Pentatriacontane						

REFERENCE : US EPA SW 846 TEST METHODS FOR EVALUATING WATER AND SOLID WASTE, 3rd ED., 2021

Sudaporn S.
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SOIL SAMPLES ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No.	: 0585/67
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Hand Auger
SAMPLING DATE	: 26/03/2024	SAMPLING TIME	: 09:31-09:43
RECEIVED DATE	: 27/03/2024	ANALYTICAL DATE	: 27/03/2024-04/04/2024
REPORT DATE	: 17/04/2024	SITE OPERATOR	: Mr. Baworn Deechaiya
SAMPLE CONDITION	: Normal	FILE CODE	: 224003_Soil_March

PARAMETER	UNIT	ANALYSIS METHODS	ND (non-detectable)	STATION MW-106 B	STANDARD ^{1/}
Total Petroleum Hydrocarbons					
- TPH (C ₅ - C ₈)	mg/kg	5035A /8260 D	< 0.003	ND	≤ 25
- Pentane					
- Benzene					
- Toluene					
- m,p-Xylene					
- o-Xylene					
- Ethylbenzene					
- TPH (C ₉ - C ₁₆)	mg/kg	3540C/8015 D	< 0.25	ND	≤ 25
- n-Nonane					
- n-Decane					
- n-Dodecane					
- n-Tetradecane					
- n-Hexadecane					
- TPH (C ₁₇ - C ₃₅)	mg/kg	3540C/8015 D	< 1.85	ND	≤ 8
- n-Octadecane					
- n-Eicosane					
- n-Docosane					
- n-Tetracosane					
- n-Hexacosane					
- n-Octacosane					
- n-Triacontane					
- n-Dotriacontane					
- n-Tetratriacontane					
- Pentatriacontane					

REFERENCE : US EPA SW 846 TEST METHODS FOR EVALUATING WATER AND SOLID WASTE, 3rd ED, 2020

Sudaporn S.

(Miss Sudaporn Soonthorn)

Analyst

REG. NO. 2-239-0-0001

Araya Tipparuk

(Mrs. Araya Tipparuk)

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SOIL SAMPLES ANALYSIS REPORT

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SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Hand Auger
SAMPLING DATE	: 23-24/04/2024	SAMPLING TIME	: 09:28-09:42, 09:17-09:30
RECEIVED DATE	: 25/04/2024	ANALYTICAL DATE	: 29/04/2024-12/05/2024
REPORT DATE	: 14/05/2024	SITE OPERATOR	: Mr. Aniwat Pimwanna
SAMPLE CONDITION	: Normal	FILE CODE	: 224003_Soil_April

PARAMETER	UNIT	ANALYSIS METHODS	ND (non-detectable)	STATION		STANDARD ^{1/}
				MW-108 B	MW-109 A	
<u>Total Petroleum Hydrocarbons</u>						
- TPH (C ₅ - C ₉)	mg/kg	5035A /8260 D	< 0.003	ND	ND	≤ 25
- Pentane						
- Benzene						
- Toluene						
- m,p-Xylene						
- o-Xylene						
- Ethylbenzene						
- TPH (C ₁₀ - C ₁₆)	mg/kg	3540C/8015 D	< 0.25	ND	ND	≤ 25
- n-Nonane						
- n-Decane						
- n-Dodecane						
- n-Tetradecane						
- n-Hexadecane						
- TPH (C ₁₇ - C ₃₅)	mg/kg	3540C/8015 D	< 1.85	3.42	6.75	≤ 8
- n-Octadecane						
- n-Eicosane						
- n-Docosane						
- n-Tetracosane						
- n-Hexacosane						
- n-Octacosane						
- n-Triacontane						
- n-Dotriacontane						
- n-Tetratriacontane						
- Pentatriacontane						

REFERENCE : US EPA SW 846 TEST METHODS FOR EVALUATING WATER AND SOLID WASTE, 3RD ED. 2020.

Sudaporn S.
(Miss Sudaporn Soonthorn)

Analyst

REG. NO. 7-239-0-0001

(Mrs. Araya Tipparuk)

Technical Management Team

REG. NO. 7-239-0-0004

- Remark :
1. Reported analysis refers to submitted sample only.
 2. This report shall not be reproduced, except in full, without official approval.
 3. ^{1/} Notification of the Ministry of Industry, B.E.2559 (2016).
 4. - Not available.



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239 RIMKLONGPRAPA ROAD, BANGSUE, BANGKOK 10800, THAILAND
TEL. (662) 959-3600 FAX (662) 959-3535 Website : secot.co.th E-mail : envserv@secot.co.th

SOIL SAMPLES ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No.	: 0794/67
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Hand Auger
SAMPLING DATE	: 23/04/2024	SAMPLING TIME	: 15:25-15:48, 10:29-10:43
RECEIVED DATE	: 25/04/2024	ANALYTICAL DATE	: 29/04/2024-12/05/2024
REPORT DATE	: 14/05/2024	SITE OPERATOR	: Mr. Aniwat Pimwanna
SAMPLE CONDITION	: Normal	FILE CODE	: 224003_Soil_April

PARAMETER	UNIT	ANALYSIS	ND	STATION		STANDARD ^{1/}
		METHODS	(non-detectable)	MW-112 A	MW-113 A	
Total Petroleum Hydrocarbons						
- TPH (C ₅ - C ₈)	mg/kg	5035A /8260 D	< 0.003	ND	ND	≤ 25
- Pentane						
- Benzene						
- Toluene						
- m,p-Xylene						
- o-Xylene						
- Ethylbenzene						
- TPH (C ₉ - C ₁₆)	mg/kg	3540C/8015 D	< 0.25	ND	ND	≤ 25
- n-Nonane						
- n-Decane						
- n-Dodecane						
- n-Tetradecane						
- n-Hexadecane						
- TPH (C ₁₆ - C ₃₅)	mg/kg	3540C/8015 D	< 1.85	1.85	3.49	≤ 8
- n-Octadecane						
- n-Eicosane						
- n-Docosane						
- n-Tetracosane						
- n-Hexacosane						
- n-Octacosane						
- n-Triacontane						
- n-Dotriacontane						
- n-Tetratriacontane						
- Pentatriacontane						

REFERENCE : US EPA SW 846 TEST METHODS FOR EVALUATING WATER AND SOLID WASTE, 1st ED., 2020.

Sudaporn S.
(Miss Sudaporn Soonthorn)
Analyst
REG. NO. 7-239-0-0001

AR
(Mrs. Araya Tipparuk)
Technical Management Team
REG. NO. 7-239-n-0004

Remark : 1. Reported analysis refers to submitted sample only.
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3. ^{1/} Notification of the Ministry of Industry, B.E.2559 (2016).
4. - Not available.

ใบรับรองผลการตรวจวัดระดับเสียงภายในสถานประกอบการ



Noise Monitoring Result : Working Noise

MTR-SPRC PLC-Refinery

Location : CDU (Near 02GM102A)

Monitor Period : Aug 06, 2024

SLM Model : SCARLET ST-21D

Serial No : 820723

Site Operator : Miss Mareeyanee Hawae

Calibrator Model : Cirrus CR:515

Serial No : 94296

Calibration Ref dB(A) : 94.0

Certified Date : 14 Feb 2024

SLM Reading / Adjust dB(A) : 93.8/0.0

Expire Date : 13 Feb 2025


Cal Sheet No.: CR-515-2024-215

Time	Equivalent Sound Pressure Level (dB(A))	
	Aug 06, 2024	
00:00 - 01:00		
01:00 - 02:00		
02:00 - 03:00		
03:00 - 04:00		
04:00 - 05:00		
05:00 - 06:00		
06:00 - 07:00		
07:00 - 08:00	86.9	
08:00 - 09:00	86.8	
09:00 - 10:00	86.8	
10:00 - 11:00	86.8	
11:00 - 12:00	86.8	
12:00 - 13:00	86.9	
13:00 - 14:00	86.9	
14:00 - 15:00	86.9	
15:00 - 16:00		
16:00 - 17:00		
17:00 - 18:00		
18:00 - 19:00		
19:00 - 20:00		
20:00 - 21:00		
21:00 - 22:00		
22:00 - 23:00		
23:00 - 24:00		
Leq(8)*	86.9	
Lmax **	97.2	
Standard-8Hr	90 dB(A)	
Standard-Max	140 dB(A)	

Remark : * Average time between 07:00-15:00

** Maximum Sound Pressure Level between 07:00-15:00


 (Miss Katesarin Vorradetwittaya)
 Environmental Scientist


 (Miss Sununta Sirawuttinanon)
 Technical Management Team



Noise Monitoring Result : Working Noise

MTR-SPRC PLC-Refinery

Location : CDU (Near 02GM102A)

Monitor Period : Nov 19, 2024

SLM Model : SCARLET ST-21D

Serial No : 820727

Site Operator : Miss Wiraya Patchimboon

Calibrator Model : Cirrus CR:515

Serial No : 94296

Calibration Ref dB(A) : 94.0

Certified Date : 14 Feb 2024

SLM Reading / Adjust dB(A) : 93.8/0.0

Expire Date : 13 Feb 2025

Cal Sheet No.: CR-515-2024-327

Time	Equivalent Sound Pressure Level (dB(A))	
	Nov 19, 2024	
00:00 - 01:00		
01:00 - 02:00		
02:00 - 03:00		
03:00 - 04:00		
04:00 - 05:00		
05:00 - 06:00		
06:00 - 07:00		
07:00 - 08:00	88.3	
08:00 - 09:00	88.1	
09:00 - 10:00	88.1	
10:00 - 11:00	88.1	
11:00 - 12:00	88.2	
12:00 - 13:00	88.1	
13:00 - 14:00	88.1	
14:00 - 15:00	88.4	
15:00 - 16:00		
16:00 - 17:00		
17:00 - 18:00		
18:00 - 19:00		
19:00 - 20:00		
20:00 - 21:00		
21:00 - 22:00		
22:00 - 23:00		
23:00 - 24:00		
Leq(8)*	88.2	
Lmax **	93.4	
Standard-8Hr	90 dB(A)	
Standard-Max	140 dB(A)	

Remark : * Average time between 07:00-15:00

** Maximum Sound Pressure Level between 07:00-15:00

(Miss Katesarin Vorradetwittaya)
Environmental Scientist

(Miss Sununta Sirawuttinanon)
Technical Management Team



Noise Monitoring Result : Working Noise

MTR-SPRC PLC-Refinery

Location : NHTU (Near 08G102A-B)

Monitor Period : Aug 06, 2024

SLM Model : SCARLET ST-21D

Serial No : 820725

Site Operator : Miss Mareeyanee Hawae

Calibrator Model : Cirrus CR:515

Serial No : 94296

Calibration Ref dB(A) : 94.0

Certified Date : 14 Feb 2024

SLM Reading / Adjust dB(A) : 93.8/0.0

Expire Date : 13 Feb 2025

Cal Sheet No.: CR-515-2024-215

Time	Equivalent Sound Pressure Level (dB(A))	
	Aug 06, 2024	
00:00 - 01:00		
01:00 - 02:00		
02:00 - 03:00		
03:00 - 04:00		
04:00 - 05:00		
05:00 - 06:00		
06:00 - 07:00		
07:00 - 08:00	84.8	
08:00 - 09:00	85.0	
09:00 - 10:00	85.1	
10:00 - 11:00	85.1	
11:00 - 12:00	85.1	
12:00 - 13:00	85.2	
13:00 - 14:00	85.1	
14:00 - 15:00	85.0	
15:00 - 16:00		
16:00 - 17:00		
17:00 - 18:00		
18:00 - 19:00		
19:00 - 20:00		
20:00 - 21:00		
21:00 - 22:00		
22:00 - 23:00		
23:00 - 24:00		
Leq(8)*	85.1	
Lmax **	92.2	
Standard-8Hr	90 dB(A)	
Standard-Max	140 dB(A)	

Remark : * Average time between 07:00-15:00

** Maximum Sound Pressure Level between 07:00-15:00

(Miss Katesarin Vorradetwittaya)
Environmental Scientist

(Miss Sununta Sirawuttinanon)
Technical Management Team



Noise Monitoring Result : Working Noise MTR-SPRC PLC-Refinery

Location : NHTU (Near 08G102A-B)

Monitor Period : Nov 19, 2024

SLM Model : SCARLET ST-21D

Serial No : 820722

Site Operator : Miss Wiraya Patchimboon

Calibrator Model : Cirrus CR:515

Serial No : 94296

Calibration Ref dB(A) : 94.0

Certified Date : 14 Feb 2024

SLM Reading / Adjust dB(A) : 93.8/0.0

Expire Date : 13 Feb 2025


Cal Sheet No.: CR-515-2024-327

Time	Equivalent Sound Pressure Level (dB(A))
	Nov 19, 2024
00:00 - 01:00	
01:00 - 02:00	
02:00 - 03:00	
03:00 - 04:00	
04:00 - 05:00	
05:00 - 06:00	
06:00 - 07:00	
07:00 - 08:00	
08:00 - 09:00	88.1
09:00 - 10:00	88.1
10:00 - 11:00	81.4
11:00 - 12:00	88.2
12:00 - 13:00	88.0
13:00 - 14:00	87.8
14:00 - 15:00	88.5
15:00 - 16:00	81.5
16:00 - 17:00	
17:00 - 18:00	
18:00 - 19:00	
19:00 - 20:00	
20:00 - 21:00	
21:00 - 22:00	
22:00 - 23:00	
23:00 - 24:00	
Leq(8)*	87.2
Lmax **	97.3
Standard-8Hr	90 dB(A)
Standard-Max	140 dB(A)

Remark : * Average time between 08:00-16:00

** Maximum Sound Pressure Level between 08:00-16:00


(Miss Katesarin Vorradetwittaya)
Environmental Scientist


(Miss Sununta Sirawuttinanon)
Technical Management Team



Noise Monitoring Result : Working Noise

MTR-SPRC PLC-Refinery

Location : Utility (Near 50C101)
SLM Model : Cirrus CR162B
Site Operator : Miss Mareeyanee Hawae

Monitor Period : Aug 06, 2024
Serial No : G302738

Calibrator Model : Cirrus CR:515
Calibration Ref dB(A) : 94.0
SLM Reading / Adjust dB(A) : 93.8/-0.1
Cal Sheet No.: CR-515-2024-216

Serial No : 94296
Certified Date : 14 Feb 2024
Expire Date : 13 Feb 2025

Time	Equivalent Sound Pressure Level (dB(A))	
	Aug 06, 2024	
00:00 - 01:00		
01:00 - 02:00		
02:00 - 03:00		
03:00 - 04:00		
04:00 - 05:00		
05:00 - 06:00		
06:00 - 07:00		
07:00 - 08:00	85.9	
08:00 - 09:00	85.5	
09:00 - 10:00	85.1	
10:00 - 11:00	84.9	
11:00 - 12:00	85.4	
12:00 - 13:00	85.2	
13:00 - 14:00	85.3	
14:00 - 15:00	85.4	
15:00 - 16:00		
16:00 - 17:00		
17:00 - 18:00		
18:00 - 19:00		
19:00 - 20:00		
20:00 - 21:00		
21:00 - 22:00		
22:00 - 23:00		
23:00 - 24:00		
Leq(8)*	85.3	
Lmax **	91.2	
Standard-8Hr	90 dB(A)	
Standard-Max	140 dB(A)	

Remark : * Average time between 07:00-15:00

** Maximum Sound Pressure Level between 07:00-15:00

(Miss Katesarin Vorradetwittaya)
 Environmental Scientist

(Miss Sununta Sirawuttinanon)
 Technical Management Team



Noise Monitoring Result : Working Noise

MTR-SPRC PLC-Refinery

Location : Utility (During 41G103A-B)

Monitor Period : Nov 19, 2024

SLM Model : SCARLET ST-21D

Serial No : 820728

Site Operator : Miss Wiraya Patchimboon

Calibrator Model : Cirrus CR:515

Serial No : 94296

Calibration Ref dB(A) : 94.0

Certified Date : 14 Feb 2024

SLM Reading / Adjust dB(A) : 93.8/0.0

Expire Date : 13 Feb 2025

Cal Sheet No.: CR-515-2024-327

Time	Equivalent Sound Pressure Level (dB(A))
	Nov 19, 2024
00:00 - 01:00	
01:00 - 02:00	
02:00 - 03:00	
03:00 - 04:00	
04:00 - 05:00	
05:00 - 06:00	
06:00 - 07:00	
07:00 - 08:00	89.4
08:00 - 09:00	89.3
09:00 - 10:00	89.4
10:00 - 11:00	89.4
11:00 - 12:00	89.4
12:00 - 13:00	89.3
13:00 - 14:00	89.3
14:00 - 15:00	89.6
15:00 - 16:00	
16:00 - 17:00	
17:00 - 18:00	
18:00 - 19:00	
19:00 - 20:00	
20:00 - 21:00	
21:00 - 22:00	
22:00 - 23:00	
23:00 - 24:00	
Leq(8)*	89.4
Lmax **	90.9
Standard-8Hr	90 dB(A)
Standard-Max	140 dB(A)

Remark : * Average time between 07:00-15:00

** Maximum Sound Pressure Level between 07:00-15:00

(Miss Katesarin Vorradetwittaya)
Environmental Scientist

(Miss Sununta Sirawuttinanon)
Technical Management Team



Noise Monitoring Result : Working Noise

MTR-SPRC PLC-Refinery

Location : RFCCU (Near 17GM102A-B)

Monitor Period : Aug 06, 2024

SLM Model : SCARLET ST-21D

Serial No : 820727

Site Operator : Miss Mareeyanee Hawae

Calibrator Model : Cirrus CR:515

Serial No : 94296

Calibration Ref dB(A) : 94.0

Certified Date : 14 Feb 2024

SLM Reading / Adjust dB(A) : 93.8/0.0


Expire Date : 13 Feb 2025


Cal Sheet No.: CR-515-2024-215

Time	Equivalent Sound Pressure Level (dB(A))	
	Aug 06, 2024	
00:00 - 01:00		
01:00 - 02:00		
02:00 - 03:00		
03:00 - 04:00		
04:00 - 05:00		
05:00 - 06:00		
06:00 - 07:00		
07:00 - 08:00	86.1	
08:00 - 09:00	86.5	
09:00 - 10:00	86.4	
10:00 - 11:00	86.3	
11:00 - 12:00	86.7	
12:00 - 13:00	86.8	
13:00 - 14:00	86.0	
14:00 - 15:00	86.9	
15:00 - 16:00		
16:00 - 17:00		
17:00 - 18:00		
18:00 - 19:00		
19:00 - 20:00		
20:00 - 21:00		
21:00 - 22:00		
22:00 - 23:00		
23:00 - 24:00		
Leq(8)*	86.5	
Lmax **	87.9	
Standard-8Hr	90 dB(A)	
Standard-Max	140 dB(A)	

Remark : * Average time between 07:00-15:00

** Maximum Sound Pressure Level between 07:00-15:00


(Miss Katesarin Vorradetwittaya)
Environmental Scientist


(Miss Sununta Sirawuttinanon)
Technical Management Team



Noise Monitoring Result : Working Noise

MTR-SPRC PLC-Refinery

Location : RFCCU (Near 17GM102A-B)
SLM Model : SCARLET ST-21D
Site Operator : Miss Wiraya Patchimboon

Monitor Period : Nov 19, 2024
Serial No : 820725

Calibrator Model : Cirrus CR:515
Calibration Ref dB(A) : 94.0
SLM Reading / Adjust dB(A) : 93.8/0.0
Cal Sheet No.: CR-515-2024-327

Serial No : 94296
Certified Date : 14 Feb 2024
Expire Date : 13 Feb 2025

Time	Equivalent Sound Pressure Level (dB(A))	
	Nov 19, 2024	
00:00 - 01:00		
01:00 - 02:00		
02:00 - 03:00		
03:00 - 04:00		
04:00 - 05:00		
05:00 - 06:00		
06:00 - 07:00		
07:00 - 08:00		
08:00 - 09:00	86.1	
09:00 - 10:00	85.3	
10:00 - 11:00	85.0	
11:00 - 12:00	85.1	
12:00 - 13:00	84.8	
13:00 - 14:00	84.8	
14:00 - 15:00	84.7	
15:00 - 16:00	85.3	
16:00 - 17:00		
17:00 - 18:00		
18:00 - 19:00		
19:00 - 20:00		
20:00 - 21:00		
21:00 - 22:00		
22:00 - 23:00		
23:00 - 24:00		
Leq(8)*	85.2	
Lmax **	97.7	
Standard-8Hr	90 dB(A)	
Standard-Max	140 dB(A)	

Remark : * Average time between 08:00-16:00

** Maximum Sound Pressure Level between 08:00-16:00

(Miss Katesarin Vorradetwittaya)
Environmental Scientist

(Miss Sununta Sirawuttinanon)
Technical Management Team



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TEL : +66(0) 2959-3600 FAX : +66(0) 2959-3535 E-mail : envserv@secot.co.th

NOISE MEASUREMENT REPORT : NOISE DOSE

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REFERENCE NO.	: SPRC-E224005-Dose-Aug24 (Cert)/Aug24(2)
MEASUREMENT BY	: SECOT Co., Ltd.	INSTRUMENT	: Noise Dosimeter
MEASUREMENT DATE	: 06/08/2024	CALIBRATOR TYPE	: Cirrus RC 110A
MEASUREMENT LOCATION	: Process area	SERIAL NO.	: 95167
SITE OPERATOR	: Miss Mareeyanee Hawae	CALIBRATOR REF.	: 1,000 Hz, 114 dB

USER NAME	AREA/PLANT	TIME	%DOSE	SOUND PRESSURE LEVEL (dB(A))	
				TWA (12-hr)	STANDARD*
Operator ID#110916	Area 2	07.25-19.00	43.0	79.6	83.0
(NHTU, DHTU, WCN, BSU)					

(Miss Katesarin Vorradetwittaya)

Environmental Scientist

(Miss Sununta Sirawuttinanon)

Technical Management Team

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 2. This report shall not be reproduced, except in full, without official approval.
 3. *Notification of the Department of Labour Protection and Welfare, B.E.2561 (2018).
 4. TWA means Time Weighted Average.



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TEL : +66(0) 2959-3600 FAX : +66(0) 2959-3535 E-mail : envserv@secot.co.th

NOISE MEASUREMENT REPORT : NOISE DOSE


CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REFERENCE NO.	: SPRC-E224005-Dose-Sep24 (Cert)/Sep24(3)
MEASUREMENT BY	: SECOT Co., Ltd.	INSTRUMENT	: Noise Dosimeter
MEASUREMENT DATE	: 11/09/2024	CALIBRATOR TYPE	: Cirrus RC 110A
MEASUREMENT LOCATION	: Process area	SERIAL NO.	: 95167
SITE OPERATOR	: Miss Wiraya Patchimboon	CALIBRATOR REF.	: 1,000 Hz, 114 dB

USER NAME	AREA/PLANT	TIME	%DOSE	SOUND PRESSURE LEVEL (dB(A))	
				TWA (12-hr)	STANDARD*
Operator ID#110789	Area 1 (CDU/VDU)	07.00-19.00	88.9	82.7	83.0
Operator ID#110490	Area 3 (SRU, Utility)	07.00-19.00	55.2	80.7	83.0



(Miss Katesarin Vorradetwittaya)

Environmental Scientist



(Miss Sununta Sirawuttinanon)

Technical Management Team

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 3. *Notification of the Department of Labour Protection and Welfare, B.E.2561 (2018).
 4. TWA means Time Weighted Average.



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TEL : +66(0) 2959-3600 FAX : +66(0) 2959-3535 E-mail : envserv@secot.co.th

NOISE MEASUREMENT REPORT : NOISE DOSE

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REFERENCE NO.	: SPRC-E224005-Dose-Sep24 (Cert)/Sep24(4)
MEASUREMENT BY	: SECOT Co., Ltd.	INSTRUMENT	: Noise Dosimeter
MEASUREMENT DATE	: 11/09/2024	CALIBRATOR TYPE	: Cirrus RC 110A
MEASUREMENT LOCATION	: Process area	SERIAL NO.	: 95167
SITE OPERATOR	: Miss Wiraya Patchimboon	CALIBRATOR REF.	: 1,000 Hz, 114 dB

USER NAME	AREA/PLANT	TIME	%DOSE	SOUND PRESSURE LEVEL (dB(A))	
				TWA (12-hr)	STANDARD*
Operator ID#110904	Area 4	07.00-19.00	110.0	83.7	83.0
	(RFCCU)				

(Miss Katesarin Vorradetwittaya)

Environmental Scientist

(Miss Sununta Sirawuttinanon)

Technical Management Team

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TEL : +66(0) 2959-3600 FAX : +66(0) 2959-3535 E-mail : envserv@secot.co.th


NOISE MEASUREMENT REPORT : NOISE DOSE

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REFERENCE NO.	: SPRC-E224005-Ns Dose(Cert)/Nov24(4)
MEASUREMENT BY	: SECOT Co., Ltd.	INSTRUMENT	: Noise Dosimeter
MEASUREMENT DATE	: 19/11/2024	CALIBRATOR TYPE	: Cirrus RC110A
MEASUREMENT LOCATION	: Process area	SERIAL NO.	: 95167
SITE OPERATOR	: Miss Wiraya Patchimboon	CALIBRATOR REF.	: 1,000 Hz, 114 dB

USER NAME	AREA/PLANT	TIME	%DOSE	SOUND PRESSURE LEVEL (dB(A))	
				TWA (12-hr)	STANDARD*
Operator ID. : 110786	Area 1 (CDU/VDU)	07.20-19.00	39.2	79.2	83.0
Operator ID. : 110851	Area 3 (SRU, Utility)	07.18-19.00	31.9	78.3	83.0


(Miss Katesarin Vorradetwittaya)

Environmental Scientist


(Miss Sununta Sirawuttinanon)

Technical Management Team

- Remark :**
1. Reported analysis refers to submitted sample only.
 2. This report shall not be reproduced, except in full, without official approval.
 3. *Notification of the Department of Labour Protection and Welfare, B.E.2561 (2018).
 4. TWA means Time Weighted Average.



บริษัท ซีคอต จำกัด

SECOT CO., LTD.

239 ถนนริมคลองประปา แขวงบางซื่อ เขตบางซื่อ กรุงเทพฯ 10800

239 RIMKLONGPRAPA ROAD, BANGSUE, BANGKOK 10800, THAILAND

TEL : +66(0) 2959-3600 FAX : +66(0) 2959-3535 E-mail : envserv@secot.co.th

NOISE MEASUREMENT REPORT : NOISE DOSE


CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REFERENCE NO.	: SPRC-E224005-Ns Dose(Cert)/Dec24(3)
MEASUREMENT BY	: SECOT Co., Ltd.	INSTRUMENT	: Noise Dosimeter
MEASUREMENT DATE	: 19/12/2024	CALIBRATOR TYPE	: Pulsar 22R
MEASUREMENT LOCATION	: Process area	SERIAL NO.	: 79781
SITE OPERATOR	: Miss Wiraya Patchimboon	CALIBRATOR REF.	: 1,000 Hz, 114 dB

USER NAME	AREA/PLANT	TIME	%DOSE	SOUND PRESSURE LEVEL (dB(A))	
				TWA (12-hr)	STANDARD*
Operator ID. : 110915	Area 2	07.18-19.00	28.8	77.9	83.0
(NHTU, DHTU, WCN, BSU)					



(Miss Katesarin Vorradetwittaya)

Environmental Scientist



(Miss Sununta Sirawuttinanon)

Technical Management Team

- Remark :**
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 2. This report shall not be reproduced, except in full, without official approval.
 3. *Notification of the Department of Labour Protection and Welfare, B.E.2561 (2018).
 4. TWA means Time Weighted Average.



บริษัท ซีคอต จำกัด

SECOT CO., LTD.

239 ถนนริมคลองประปา แขวงบางซื่อ เขตบางซื่อ กรุงเทพฯ 10800

239 RIMKLONGPRAPA ROAD, BANGSUE, BANGKOK 10800, THAILAND

TEL : +66(0) 2959-3600 FAX : +66(0) 2959-3535 E-mail : envserv@secot.co.th

NOISE MEASUREMENT REPORT : NOISE DOSE

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REFERENCE NO.	: SPRC-E224005-Ns Dose(Cert)/Nov24(5)
MEASUREMENT BY	: SECOT Co., Ltd.	INSTRUMENT	: Noise Dosimeter
MEASUREMENT DATE	: 19/11/2024	CALIBRATOR TYPE	: Cirrus RC110A
MEASUREMENT LOCATION	: Process area	SERIAL NO.	: 95167
SITE OPERATOR	: Miss Wiraya Patchimboon	CALIBRATOR REF.	: 1,000 Hz, 114 dB

USER NAME	AREA/PLANT	TIME	%DOSE	SOUND PRESSURE LEVEL (dB(A))	
				TWA (12-hr)	STANDARD*
Operator ID. : 110900	Area 4 (RFCCU)	07.19-19.00	119.4	84.0	83.0

(Miss Katesarin Vorradetwittaya)

Environmental Scientist

(Miss Sununta Sirawuttinanon)

Technical Management Team

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 4. TWA means Time Weighted Average.

ภาคผนวก จ

ข้อมูลการตรวจเทียบเครื่องมือ
(Calibration Data Sheets)

THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Mechanical Engineering Standards Laboratory Soi 1, Bangpoo Industrial Estate, Muang, Samutprakan 10280, Thailand.

Request No.23-67/0383

MTC.No.23-67/0383

Number of page(s) 2

CALIBRATION CERTIFICATE

Nomenclature : DRYCAL

Manufacturer : Mesa Labs

Serial No.: 114069

Model : Defender 520-H

Scale range : 300 ml/min to 30,000 ml/min

Subdivision : (0.0001, 0.001) L/min

Submitted by : SECOT CO.,LTD.

239, Rimklongprapa Road, Bangsue,

Bangkok 10800, Thailand.

Received date : 2 April 2024

Condition of measured item : Normal

Calibration date : 7 May 2024

Standard :

Standard	Certificate No.	Date due	Traceability
RTD Thermometer	PSL-T 643/65	1-Jun-24	TISTR
Molbox/Pressure Transducer/UpStream	MP-0076-23	2-Apr-25	NIMT
Primary Flow Calibrator S/N 119216	MW-0035-23	31-May-25	NIMT

Calibrated by : Terasak Panna

(Mr.Terasak Panna)

Approved by :

(Ms.Kirana Kuanghirin)

Mechanical Engineering Standards Laboratory

Ref. 20132670420197001

Issued Date 13 May 2024

The results relate only to the items tested/calibrated or value assigned.

Advertising the Report/Certificate and publicity of the results except in full are prohibited unless written permission is obtained from the governor of TISTR.

FM.BLMTC.002 Rev.4

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Amphoe Muang, Changwat Samutprakan 10280, Thailand
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Office
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Thailand
Tel. (66) 0 2579 1121-30 ext. 5219, 5225, 5217
Fax. (66) 0 2579 8592
E-mail : sumalee@tistr.or.th

THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Mechanical Engineering Standards Laboratory Soi 1, Bangpoo Industrial Estate, Muang, Samutprakan 10280, Thailand.

Request No.23-67/0383

2/2

MTC.No.23-67/0383

Calibration point : (1.5, 5.0, 10, 15, 25) L/min

Ambient condition : Temperature (23 ± 3) °C , Relative humidity (55 ± 15) %

Atmospheric pressure (1010±13) hPa

Calibration method : The flowmeter (UUC) was calibrated by comparison method with standard flowmeter according to CP-370.01.

The reported value is the value that converted to value at reference condition within pressure and temperature of the actual gas entering the UUC

Measurement data :

UUC Value (L/min)	Standard Value (L/min)	Temperature (°C)	Pressure (hPa)	Deviation (%)	Uncertainty (%)
1.5116	1.4904	25.492	1007.32	+1.42	0.93
5.0284	4.9847	25.446	1007.65	+0.88	0.92
10.072	10.027	25.442	1008.43	+0.45	0.92
15.109	15.087	25.457	1009.62	+0.15	0.91
25.206	25.160	25.520	1013.18	+0.18	0.91

The reported expanded uncertainties are based on standard uncertainties multiplied by a coverage factor $k=2$, which provides a level of confidence of approximately 95%.

The end of calibration certificate.

Ts.

The results relate only to the items tested/calibrated or value assigned.

Advertising the Report/Certificate and publicity of the results except in full are prohibited unless written permission is obtained from the governor of TISTR.

FM.BLMTC.002 Rev.4

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Thailand
Tel. (66) 0 2579 1121-30 ext. 5219, 5225, 5217
Fax. (66) 0 2579 8592
E-mail : sumalee@tistr.or.th

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number: E04NI99E15AC084 Reference Number: 82-401409170-1
Cylinder Number: EB0102326 Cylinder Volume: 144.4 CF
Laboratory: 124 - Riverton (SAP) - NJ Cylinder Pressure: 2015 PSIG
PGVP Number: B52019 Valve Outlet: 660
Gas Code: CO,NO,NOX,SO2,BALN Certification Date: Feb 05, 2019

Expiration Date: Feb 05, 2027

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume 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	50.00 PPM	51.01 PPM	G1	+/- 0.9% NIST Traceable	01/28/2019, 02/05/2019
NITRIC OXIDE	50.00 PPM	50.86 PPM	G1	+/- 0.9% NIST Traceable	01/28/2019, 02/05/2019
SULFUR DIOXIDE	50.00 PPM	50.87 PPM	G1	+/- 1.0% NIST Traceable	01/28/2019, 02/05/2019
CARBON MONOXIDE	0.5000 %	0.5050 %	G1	+/- 0.7% NIST Traceable	01/31/2019
NITROGEN	Balance				

CALIBRATION STANDARDS					
Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	13080206	CC401947	4950 PPM CARBON MONOXIDE/NITROGEN	+/- 0.4%	Feb 15, 2019
PRM	12367	APEX1099237	9.82 PPM NITROGEN DIOXIDE/AIR	+/- 2.0%	Jun 02, 2017
NTRM	12010724	KAL004497	50.03 PPM NITRIC OXIDE/NITROGEN	+/- 0.8%	Mar 12, 2024
GMIS	1114201601	CC506710	4.971 PPM NITROGEN DIOXIDE/NITROGEN	+/- 2.0%	Nov 14, 2019
NTRM	14010327	KAL004376	49.08 PPM SULFUR DIOXIDE/NITROGEN	+/- 1.0%	Apr 17, 2024

The SRM, PRM or RGM noted above is only in reference to the GMIS used in the assay and not part of the analysis.

ANALYTICAL EQUIPMENT		
Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Siemens Ultramat 6 J3-598 COHIGH	NDIR	Jan 18, 2019
Nicolet 6700 APW1100391 NO	FTIR	Jan 10, 2019
Nicolet 6700 APW1100391 NO2	FTIR	Jan 10, 2019
Nicolet 6700 APW1100391 SO2	FTIR	Jan 10, 2019

Triad Data Available Upon Request

PERMANENT NOTES: PRODUCED IN ACCORDANCE WITH ISO17025 REQUIREMENTS

NOTES:

Gross Weight: 27806.3 grams

Net Weight: 4733.2 grams

This calibration std. has been certified in accordance with the May 2012 EPA Traceability Protocol Document EPA-600/R-12/531. All testing processes and measurements conform to the requirements of ISO/IEC 17025 and to Airgas ISO 9001:2008 and relate only to items identified on this certificate. All results are certified to be NIST Traceable with total uncertainty as detailed under Analytical Uncertainty. This document shall not be reproduced in full without written approval of the issuer.



TESTING CERT No. 3082.05

[Signature]
Approved for Release

Page 1 of 82-401409170-1

THE LINDE GROUP

Linde

Certificate Of Analysis

Special Gases Mixture

Customer Details

Name:

Secot Co., Ltd.

Address:

239 Rimklongpropa Rd. Bangsue Khet Bangsue
Bangkok 10800

Customer Tag No.:

Certificate Details

Number: 0483/23

Date of Issue: 22-Feb-2023

Expiry date: 21-Feb-2027

Material Details

Production Order: 90176403

Material Code: 478100-J-62

Cylinder No.: 51108

Gas content: 6.520 M³ (nominal)

Filling pressure: 145 bar (g)

Valve: CGA 590 BRASS

Cylinder Owner: LINDE

Cylinder Material: STEEL

Cylinder Size: 47 L

Laboratory Report

Component	Normal Concentration	Analysis Result ¹	Uncertainty ²	Method of Analysis ³
Oxygen	8.00%	7.93%	± 2% relative	(1) SG-0-01
In Nitrogen				

Recommend usage condition

Minimum utilization: 5% of actual content or before expire date whichever comes first.

Storage condition: Keep in well ventilation and secure area.

Comments

Note:

1. All results expressed in this report are on mole/mole basis, unless otherwise specified.
2. The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95%. The measurement of this material is traceable to the SI through the reference gas standard which is traceable to Swiss National Standard of Mass or other recognised national metrology institutes.
3. (1) Gas Chromatography, (2) Paramagnetic Oxygen Analyzer, (3) Electrochemical Oxygen Analyzer, (4) Electrochemical Moisture Analyzer, (5) Total Hydrocarbon Analyzer, (6) Other - Specified

Sukanya Parinyasontorn

Signatory for and on behalf of Linde (Thailand) Co., Ltd.

Page 1 of 1

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PB-002/F004

Iss:K/2, 15 Oct 2021

บริษัท ลินด์ (ประเทศไทย) จำกัด (มหาชน)

เลขที่ใบแจ้งหนี้: 010752100765

วันที่ 15 พฤษภาคม 2567 ณ 2/3 หมู่ 14 ตำบลบางนา-ตลาด ถนน 6.5 กิโลเมตร

เลขที่ใบแจ้งหนี้: 10540 โทรสาร (66) 2338-6100 โทรสาร (66) 2338-6333

เลขที่ใบแจ้งหนี้: 105 หมู่ 5 ตำบลบางนา ตำบลบางนา ตำบลบางนา 24180

โทรสาร (66) 38.570-479-93

โทรสาร (66) 38.570-323

Linde (Thailand) Public Company Limited

P.C. Registration No. 010752100765

15th Floor, Bangna Tower A, 2/3 Moo 14, Bangna-Chat Km. 6.5 Road, Bangnaew

Bangplee, Samutprakan 10540, Tel (66) 2338-6100 Fax (66) 2338-6333

Wellgrow Plant: 105 Moo 5, T.Bangsamak, A.Bangnaung, Chachoengsao 24180

Thailand, Tel (66) 38.570-479-93

Fax (66) 38.570-323

THE LINDE GROUP

Linde

Certificate Of Analysis
Special Gases Mixture

Customer Details

Name: Secot Co., Ltd. Address: 239, Rimklongprapa Rd., Bangsue, Bangkok 10800 Customer Tag No.:

Certificate Details

Number: 0527/23 Date of Issue: 8-Mar-2023 Expiry date: 8-Mar-2026
Material Details
Production Order: 90176406 Material Code: 511600-SK-34 Cylinder No.: A008785K
Gas content: 5.20 M³ Filling pressure: 137.0 bar Valve: CGA 660 SS
Cylinder Owner: LINDE Cylinder Material: Spectra seal Cylinder Size: 40 L

Laboratory Report

Analytical Result

Component	Normal Concentration	Analysis Result ¹	Uncertainty ²	Method of Analysis ³	Assay Date
Nitric Oxide	40.0 ppm	39.8 ppm	± 1% relative	(6) I-PB-352	1-Mar & 8-Mar-23
Other NOx impurity		Less than 1.9 ppm			
Carbon Monoxide In Nitrogen	40.0 ppm	42.0 ppm	± 1% relative	(6) I-PB-352	1-Mar-2023

Reference Standard used in Assay

Reference Standard	Cylinder number	Concentration	Expiry date:
Nitric Oxide	1332615G	25.61 ± 0.13 ppm	6-May-2023
Carbon Monoxide In Nitrogen	NDS2320	25.03 ± 0.13 ppm	7-Oct-2023

Analytical Instruments used in Assay

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
FTIR Spectrometers Nicolet iS50	FTIR-NO	28-Feb-2023
FTIR Spectrometers Nicolet iS50	FTIR-CO	25-Feb-2023

Recommend usage condition

Minimum utilization: 5% of actual content or before expire date whichever comes first.

Storage condition: Keep in well ventilation and secure area.

Comments

When reordering, please quote the material number

Note:

1. All results expressed in this report are on mole/mole basis, unless otherwise specified. The Assay of this Standard has been performed in accordance with the EPA Traceability Protocol EPA-600/R-12/531 for the Assay and Certification of Gaseous Calibration Standards using procedure G1.
2. The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95%. The measurement of this material is traceable to the SI through the reference gas standard which is traceable to Swiss National Standard of Mass or other recognised national metrology institutes.
3. (1) Gas Chromatography, (2) Paramagnetic Oxygen Analyzer, (3) Electrochemical Oxygen Analyzer, (4) Electrochemical Moisture Analyzer, (5) Total Hydrocarbon Analyzer, (6) Other - Specified

Sukanya Parinyasontorn
Signatory for and on behalf of Linde (Thailand) Co., Ltd.

Linde (Thailand) Public Company Limited Iss:K/2, 15 Oct 2021
P.L.C. registration no. 0107537000785
15th Floor, Bangna Tower A, 2/3 Moo 14, Bangna Trad KM. 6.5 Road, Bangkaew
Bangplee, Samutprakarn 10540, Tel (66) 2338-6100 Fax (66) 2338-6333
Wellgrow Plant: 105 Moo 5, T.Bangsamak, A.Bangpakong, Chachoengsao 24180
Thailand, Tel (66) 38.570-479-93 Fax (66) 38.570-323

Page 1 of 1

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บริษัท ลินด์ (ประเทศไทย) จำกัด (มหาชน)

เลขที่ใบแจ้งหนี้: 0107537000785

เป็น 15 มอนท์จากวันที่ 2/3 มี.ค. 14 ณ กรุงเทพมหานคร ณ. 6.5 กิโลเมตร

อ.บางพลี อ.สมุทรปราการ 10540 โทรศัพท์ (66) 2338-6100 โทรสาร (66) 2338-6333

โรงงานแบริ่ง: 105 มี.ค. 5 อ.บางพลี อ.สมุทรปราการ 24180

โทรศัพท์ (66) 38.570-479-93 โทรสาร (66) 38.570-323

THE LINDE GROUP

Linde

Certificate Of Analysis
Special Gases Mixture

Customer Details

Name: Secot Co., Ltd. Address: 239, Rimklongprapa Rd., Bangsue, Bangkok 10800 Customer Tag No.:

Certificate Details

Number: 0742/23 Date of Issue: 29-Mar-2023 Expiry date: 29-Mar-2027
Material Details
Production Order: 90176408 Material Code: 608400-SK-44 Cylinder No.: A009405K
Gas content: 5.52 M³ Filling pressure: 145.0 bar Valve: CGA 660 SS
Cylinder Owner: LINDE Cylinder Material: Spectra seal Cylinder Size: 40 L

Laboratory Report

Analytical Result

Component	Normal Concentration	Analysis Result ¹	Uncertainty ²	Method of Analysis ³	Assay Date
Sulphur Dioxide In Nitrogen	40.0 ppm	40.2 ppm	± 1% relative	(6) I-PB-352	22-Mar & 29-Mar-23

Reference Standard used in Assay

Reference Standard	Cylinder number	Concentration	Expiry date:
Sulphur Dioxide In Nitrogen	256240	52.73 ± 0.42 ppm	6-May-2023

Analytical Instruments used in Assay

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
FTIR Spectrometers Nicolet iS50	FTIR-SO2	17-Mar-2023

Recommend usage condition

Minimum utilization: 5% of actual content or before expire date whichever comes first.

Storage condition: Keep in well ventilation and secure area.

Comments

When reordering, please quote the material number

Note:

1. All results expressed in this report are on mole/mole basis, unless otherwise specified. The Assay of this Standard has been performed in accordance with the EPA Traceability Protocol EPA-600/R-12/531 for the Assay and Certification of Gaseous Calibration Standards using procedure G1.
2. The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95%. The measurement of this material is traceable to the SI through the reference gas standard which is traceable to Swiss National Standard of Mass or other recognised national metrology institutes.
3. (1) Gas Chromatography, (2) Paramagnetic Oxygen Analyzer, (3) Electrochemical Oxygen Analyzer, (4) Electrochemical Moisture Analyzer, (5) Total Hydrocarbon Analyzer, (6) Other - Specified

Sukanya Parinyasontorn
Signatory for and on behalf of Linde (Thailand) Co., Ltd.

Page 1 of 1

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บริษัท ลินด์ (ประเทศไทย) จำกัด (มหาชน)

เลขที่ใบแจ้งหนี้: 0107537000785

เป็น 15 มอนท์จากวันที่ 2/3 มี.ค. 14 ณ กรุงเทพมหานคร ณ. 6.5 กิโลเมตร

อ.บางพลี อ.สมุทรปราการ 10540 โทรศัพท์ (66) 2338-6100 โทรสาร (66) 2338-6333

โรงงานแบริ่ง: 105 มี.ค. 5 อ.บางพลี อ.สมุทรปราการ 24180

โทรศัพท์ (66) 38.570-479-93 โทรสาร (66) 38.570-323

Linde (Thailand) Public Company Limited Iss:K/2, 15 Oct 2021
P.L.C. registration no. 0107537000785
15th Floor, Bangna Tower A, 2/3 Moo 14, Bangna Trad KM. 6.5 Road, Bangkaew
Bangplee, Samutprakarn 10540, Tel (66) 2338-6100 Fax (66) 2338-6333
Wellgrow Plant: 105 Moo 5, T.Bangsamak, A.Bangpakong, Chachoengsao 24180
Thailand, Tel (66) 38.570-479-93 Fax (66) 38.570-323

Making our world more productive



Certificate Of Analysis Special Gases Mixture

Customer Details		Customer Tag No.:	
Name:	Address:		
Secot Co.,Ltd.	239, Rimklongprapa Rd., Bangsue, Bangkok 10800		
Certificate Details			
Number:	1393/24	Date of Issue:	24-May-2024
		Expiry date:	24-May-2027
Material Details			
Production Order:	90183672	Material Code:	436700-SK-34
Gas content:	6.900 M ³	Cylinder No.:	A00987SK
		Filling pressure:	145 bar
		Valve:	CGA 660 SS
Cylinder Owner:	LINDE	Cylinder Material:	Spectra seal
		Cylinder Size:	40 L

Laboratory Report

Analytical Result					
Component	Nominal Concentration	Analysis Result ¹	Uncertainty ²	Method of Analysis ³	Assay Date
Nitric Oxide	80.0 ppm	79.0 ppm	± 1% relative	(6) I-PB-352	15 & 23-May-2024
Other NOx impurity		Less Than 3.9 ppm			
Carbon Monoxide In Nitrogen	80.0 ppm	81.7 ppm	± 1% relative	(6) I-PB-352	15 & 23-May-2024

Reference Standard used in Assay			
Reference Standard	Cylinder number	Concentration	Expiry date:
Carbon Monoxide	D619725	70.6 ± 0.2 ppm	20-Sep-2026
Nitric Oxide In Nitrogen	D619725	70.6 ± 0.2 ppm	20-Sep-2026

Analytical Instruments used in Assay		
Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
FTIR Spectrometers Nicolet iS50	FTIR-CO	7-May-2024
FTIR Spectrometers Nicolet iS50	FTIR-NO	7-May-2024

Recommend usage condition

Minimum utilization: 5% of actual content or before expiry date whichever comes first.

Storage condition: Keep in well ventilation and secure area.

Comments

When reordering, please quote the material number

Note:

- All results expressed in this report are on mole/mole basis, unless otherwise specified. The Assay of this Standard has been performed in accordance with the EPA Traceability Protocol EPA-600/R-12/S31 for the Assay and Certification of Gaseous Calibration Standards using procedure G1
- The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95%. The measurement of this material is traceable to the SI through the reference gas standard which is traceable to Swiss National Standard of Mass or other recognised national metrology institutes.
- (1) Gas Chromatography, (2) Paramagnetic Oxygen Analyzer, (3) Electrochemical Oxygen Analyzer, (4) Electrochemical Moisture Analyzer, (5) Total Hydrocarbon Analyzer, (6) Other - Specified

Sukanya Parinyasoonorn
Signatory for and on behalf of Linde (Thailand) Co., Ltd.

Page 1 of 1

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PB-002/F006

Iss: M/1, 01 December 2023

บริษัท ลินด์ (ประเทศไทย) จำกัด (มหาชน)

เลขที่ใบอนุญาตประกอบกิจการ 0107537000785

ชั้น 15 อาคารทาวเวอร์ เอ 2/3 หมู่ 14 ถนนพหลโยธิน-ลาดพร้าว กม. 6.5 แขวงคลองจั่น

เขตปทุมธานี กรุงเทพมหานคร 10540 โทรศัพท์ (66) 2338-6100 โทรสาร (66) 2338-6333

โรงงานผลิตแก๊ส: 105 หมู่ 5 ตำบลหนองปรือ อำเภอบางพลี จังหวัดสมุทรปราการ 24180

โทรศัพท์ (66) 38.570-479-93

โทรสาร (66) 38.570-323

Linde (Thailand) Public Company Limited

P.L.C. Registration No. 0107537000785

15th Floor, Bangna Tower A, 2/3 Moo 14, Bangna Trad KM. 6.5 Road, Bangkwaew

Bangplee, Samutprakarn 10540, Tel (66) 2338-6100 Fax (66) 2338-6333

Wellgrow Plant: 105 Moo 5, T.Bangsamak, A.Bangpakong, Chachoengsao 24180

Thailand, Tel (66) 38.570-479-93

Fax (66) 38.570-323

THE LINDE GROUP



Certificate Of Analysis Special Gases Mixture

Customer Details		Customer Tag No.:	
Name:	Address:		
Secot Co.,Ltd.	239, Rimklongprapa Rd., Bangsue, Bangkok 10800		
Certificate Details			
Number:	0273/22	Date of Issue:	4-Feb-2022
Material Details		Expiry date:	4-Feb-2030
Production Order:	90169723	Material Code:	445100-SK-44
Gas content:	5.52 M ³	Cylinder No.:	D636047
Cylinder Owner:	LINDE	Filling pressure:	145.0 bar
		Valve:	CGA 660 SS
		Cylinder Material:	Spectra seal
		Cylinder Size:	40 L

Laboratory Report

Analytical Result					
Component	Nominal Concentration	Analysis Result ¹	Uncertainty ²	Method of Analysis ³	Assay Date
Sulphur Dioxide In Nitrogen	80.0 ppm	81.0 ppm	± 1% relative	(6) I-PB-352	28-Jan & 4-Feb-22

Reference Standard used in Assay			
Reference Standard	Cylinder number	Concentration	Expiry date:
Sulphur Dioxide In Nitrogen	256240	52.73 ± 0.42 ppm	6-May-2023

Analytical Instruments used in Assay		
Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
FTIR Spectrometers Nicolet iS50	FTIR-SO2	10-Jan-2022

Recommend usage condition

Minimum utilization: 5% of actual content or before expiry date whichever comes first.

Storage condition: Keep in well ventilation and secure area.

Comments

When reordering, please quote the material number

Note:

- All results expressed in this report are on mole/mole basis, unless otherwise specified. The Assay of this Standard has been performed in accordance with the EPA Traceability Protocol EPA-600/R-12/S31 for the Assay and Certification of Gaseous Calibration Standards using procedure G1
- The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95%. The measurement of this material is traceable to the SI through the reference gas standard which is traceable to Swiss National Standard of Mass or other recognised national metrology institutes.
- (1) Gas Chromatography, (2) Paramagnetic Oxygen Analyzer, (3) Electrochemical Oxygen Analyzer, (4) Electrochemical Moisture Analyzer, (5) Total Hydrocarbon Analyzer, (6) Other - Specified

Sukanya Parinyasoonorn
Signatory for and on behalf of Linde (Thailand) Co., Ltd.

Page 1 of 1

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PB-002/F006

Iss: K/2, 15 Oct 2021

บริษัท ลินด์ (ประเทศไทย) จำกัด (มหาชน)

เลขที่ใบอนุญาตประกอบกิจการ 0107537000785

ชั้น 15 อาคารทาวเวอร์ เอ 2/3 หมู่ 14 ถนนพหลโยธิน-ลาดพร้าว กม. 6.5 แขวงคลองจั่น

เขตปทุมธานี กรุงเทพมหานคร 10540 โทรศัพท์ (66) 2338-6100 โทรสาร (66) 2338-6333

โรงงานผลิตแก๊ส: 105 หมู่ 5 ตำบลหนองปรือ อำเภอบางพลี จังหวัดสมุทรปราการ 24180

โทรศัพท์ (66) 38.570-479-93

โทรสาร (66) 38.570-323

Linde (Thailand) Public Company Limited

P.L.C. Registration No. 0107537000785

15th Floor, Bangna Tower A, 2/3 Moo 14, Bangna Trad KM. 6.5 Road, Bangkwaew

Bangplee, Samutprakarn 10540, Tel (66) 2338-6100 Fax (66) 2338-6333

Wellgrow Plant: 105 Moo 5, T.Bangsamak, A.Bangpakong, Chachoengsao 24180

Thailand, Tel (66) 38.570-479-93

Fax (66) 38.570-323

Certificate Of Analysis
Special Gases Mixture

Customer Details			
Name:	Address:	Customer Tag No.:	
Secot Co., Ltd.	239 Rimklongprapa Rd. Bangsue Khet Bangsue Bangkok 10800		

Certificate Details					
Number:	0484/23	Date of Issue:	22-Feb-2023	Expiry date:	21-Feb-2027
Material Details					
Production Order:	90176403	Material Code:	478100-J-62	Cylinder No.:	12360
Gas content:	6.520 M ³ (nominal)	Filling pressure:	145 bar (g)	Valve:	CGA 590 BRASS
Cylinder Owner:	LINDE	Cylinder Material:	STEEL	Cylinder Size:	47 L

Laboratory Report				
Component	Normal Concentration	Analysis Result ¹	Uncertainty ²	Method of Analysis ³
Oxygen	8.00%	7.94%	± 2% relative	(1) SG-O-01
In Nitrogen				

Recommend usage condition

Minimum utilization: 5% of actual content or before expire date whichever comes first.

Storage condition: Keep in well ventilation and secure area.

Comments

Note:

- All results expressed in this report are on mole/mole basis, unless otherwise specified.
- The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95%. The measurement of this material is traceable to the SI through the reference gas standard which is traceable to Swiss National Standard of Mass or other recognised national metrology institutes.
- (1) Gas Chromatography, (2) Paramagnetic Oxygen Analyzer, (3) Electrochemical Oxygen Analyzer, (4) Electrochemical Moisture Analyzer, (5) Total Hydrocarbon Analyzer, (6) Other - Specified

Sukanya Parinyasoonorn

Signatory for and on behalf of Linde (Thailand) Co., Ltd.

Page 1 of 1

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PB-002/F004
Iss:K/2, 15 Oct 2021

บริษัท ลินด์ (ประเทศไทย) จำกัด (มหาชน)

เลขที่ใบอนุญาตประกอบธุรกิจ 0107537000785

ชั้น 15 อาคารทรูทาวเวอร์ 2/3 หมู่ 14 ถนนรามคำแหง-ตราด กม. 6.5 แขวงคลองเตย

เขตคลองเตย กรุงเทพมหานคร 10540 โทรศัพท์ (66) 2338-6100 โทรสาร (66) 2338-6333

โรงงานผลิต: 105 หมู่ 5 ตำบลคลองเตย อำเภอบางพลี จังหวัดสมุทรปราการ 24180

โทรศัพท์ (66) 38.570-479-93

โทรสาร (66) 38.570-323

Linde (Thailand) Public Company Limited

P.L.C. Registration no. 0107537000785

15th Floor, Bangna Tower A, 2/3 Moo 14, Bangna Trad KM. 6.5 Road, Bangkew

Bangplee, Samutprakarn 10540, Tel (66) 2338-6100 Fax (66) 2338-6333

Wellgrow Plant: 105 Moo 5, T.Bangsamak, A.Bangpakong, Chachoengsao 24180

Thailand, Tel (66) 38.570-479-93

Fax (66) 38.570-323

Certificate Of Analysis
Special Gases Mixture

Customer Details			
Name:	Address:	Customer Tag No.:	
Secot Co., Ltd.	239, Rimklongprapa Rd., Bangsue, Bangkok 10800		

Certificate Details					
Number:	0528/23	Date of Issue:	8-Mar-2023	Expiry date:	8-Mar-2026
Material Details					
Production Order:	90176406	Material Code:	511600-SK-34	Cylinder No.:	A00722SK
Gas content:	5.20 M ³	Filling pressure:	137.0 bar	Valve:	CGA 660 SS
Cylinder Owner:	LINDE	Cylinder Material:	Spectra seal	Cylinder Size:	40 L

Laboratory Report					
Analytical Result					
Component	Normal Concentration	Analysis Result ¹	Uncertainty ²	Method of Analysis ³	Assay Date
Nitric Oxide	40.0 ppm	39.6 ppm	± 1% relative	(6) I-PB-352	1-Mar & 8-Mar-23
Other NOx Impurity		Less than 1.9 ppm			
Carbon Monoxide In Nitrogen	40.0 ppm	41.9 ppm	± 1% relative	(6) I-PB-352	1-Mar-2023

Reference Standard used in Assay

Reference Standard	Cylinder number	Concentration	Expiry date:
Nitric Oxide	1332615G	25.61 ± 0.13 ppm	6-May-2023
Carbon Monoxide	ND52320	25.03 ± 0.13 ppm	7-Oct-2023
In Nitrogen			

Analytical Instruments used in Assay

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
FTIR Spectrometers Nicolet iS50	FTIR-NO	28-Feb-2023
FTIR Spectrometers Nicolet iS50	FTIR-CO	25-Feb-2023

Recommend usage condition

Minimum utilization: 5% of actual content or before expire date whichever comes first.

Storage condition: Keep in well ventilation and secure area.

Comments

When reordering, please quote the material number

Note:

- All results expressed in this report are on mole/mole basis, unless otherwise specified. The Assay of this Standard has been performed in accordance with the EPA Traceability Protocol EPA-600/R-12/531 for the Assay and Certification of Gaseous Calibration Standards using procedure G1.
- The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95%. The measurement of this material is traceable to the SI through the reference gas standard which is traceable to Swiss National Standard of Mass or other recognised national metrology institutes.
- (1) Gas Chromatography, (2) Paramagnetic Oxygen Analyzer, (3) Electrochemical Oxygen Analyzer, (4) Electrochemical Moisture Analyzer, (5) Total Hydrocarbon Analyzer, (6) Other - Specified

Sukanya Parinyasoonorn

Signatory for and on behalf of Linde (Thailand) Co., Ltd.

PB-002/F006

Page 1 of 1

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บริษัท ลินด์ (ประเทศไทย) จำกัด (มหาชน)

เลขที่ใบอนุญาตประกอบธุรกิจ 0107537000785

ชั้น 15 อาคารทรูทาวเวอร์ 2/3 หมู่ 14 ถนนรามคำแหง-ตราด กม. 6.5 แขวงคลองเตย

เขตคลองเตย กรุงเทพมหานคร 10540 โทรศัพท์ (66) 2338-6100 โทรสาร (66) 2338-6333

โรงงานผลิต: 105 หมู่ 5 ตำบลคลองเตย อำเภอบางพลี จังหวัดสมุทรปราการ 24180

Linde (Thailand) Public Company Limited

P.L.C. Registration no. 0107537000785

15th Floor, Bangna Tower A, 2/3 Moo 14, Bangna Trad KM. 6.5 Road, Bangkew

Bangplee, Samutprakarn 10540, Tel (66) 2338-6100 Fax (66) 2338-6333

Wellgrow Plant: 105 Moo 5, T.Bangsamak, A.Bangpakong, Chachoengsao 24180

THE LINDE GROUP

Linde

Certificate Of Analysis
Special Gases Mixture

Customer Details

Name: Secot Co., Ltd. Address: 239, Rimklongprapa Rd., Bangsue, Bangkok 10800 Customer Tag No.:

Certificate Details

Number: 0275/22 Date of Issue: 4-Feb-2022 Expiry date: 4-Feb-2026
Material Details
Production Order: 90169722 Material Code: 631500-SK-44 Cylinder No.: D636195
Gas content: 5.52 M³ Filling pressure: 145.0 bar Valve: CGA 660 SS
Cylinder Owner: LINDE Cylinder Material: Spectra seal Cylinder Size: 40 L

Laboratory Report

Analytical Result

Component	Normal Concentration	Analysis Result ¹	Uncertainty ²	Method of Analysis ³	Assay Date
Sulphur Dioxide In Nitrogen	20.0 ppm	20.4 ppm	± 1% relative	(6) I-PB-352	28-Jan & 4-Feb-22

Reference Standard used in Assay

Reference Standard	Cylinder number	Concentration	Expiry date:
Sulphur Dioxide In Nitrogen	1457545G	25.03 ± 0.25 ppm	18-Aug-2022

Analytical Instruments used in Assay

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
FTIR Spectrometers Nicolet iS50	FTIR-SO2	27-Jan-2022

Recommend usage condition

Minimum utilization: 5% of actual content or before expire date whichever comes first.
Storage condition: Keep in well ventilation and secure area.

Comments

When reordering, please quote the material number

Note:

1. All results expressed in this report are on mole/mole basis, unless otherwise specified. The Assay of this Standard has been performed in accordance with the EPA Traceability Protocol EPA-600/R-12/531 for the Assay and Certification of Gaseous Calibration Standards using procedure G1.
2. The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95%. The measurement of this material is traceable to the SI through the reference gas standard which is traceable to Swiss National Standard of Mass or other recognised national metrology institutes.
3. (1) Gas Chromatography, (2) Paramagnetic Oxygen Analyzer, (3) Electrochemical Oxygen Analyzer, (4) Electrochemical Moisture Analyzer, (5) Total Hydrocarbon Analyzer, (6) Other - Specified

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บริษัท ลินด์ (ประเทศไทย) จำกัด (มหาชน)

เลขที่ใบอนุญาตประกอบกิจการ 010733000785

ชั้น 15 อาคารทาวเวอร์ 2/3 หมู่ 14 ถนนบางนา-ตราด กม. 6.5 แขวงบางนา

Bangplee, Samutprakarn 10540 โทรศัพท์ (66) 2338-6100 โทรสาร (66) 2338-6333

โรงงานผลิต: 105 หมู่ 5 ตำบลบางกอบัว อำเภอบางพลี จังหวัดสมุทรปราการ 24180

โทรศัพท์ (66) 38.570-479-93

โทรสาร (66) 38.570-323

Sukanya Parinyasoonorn

Signatory for and on behalf of Linde (Thailand) Co., Ltd.

PB-002/F006

Iss:K/2, 15 Oct 2021

Linde (Thailand) Public Company Limited

PIC Registration no 010733000785

15th Floor, Bangna Tower A, 2/3 Moo 14, Bangna Trad KM. 6.5 Road, Bangnaeew

Bangplee, Samutprakarn 10540, Tel (66) 2338-6100 Fax (66) 2338-6333

Wellgrow Plant: 105 Moo 5, T.Bangsamak, A.Bangpakong, Chachoengsao 24180

Thailand, Tel (66) 38.570-479-93

Fax (66) 38.570-323

THE LINDE GROUP

Linde

Certificate Of Analysis
Special Gases Mixture

Customer Details

Name: Secot Co., Ltd. Address: 239, Rimklongprapa Rd., Bangsue, Bangkok 10800 Customer Tag No.:

Certificate Details

Number: 0529/23 Date of Issue: 7-Mar-2023 Expiry date: 7-Mar-2026
Material Details
Production Order: 90176407 Material Code: 436700-SK-34 Cylinder No.: A00818SK
Gas content: 5.23 M³ Filling pressure: 137.0 bar Valve: CGA 660 SS
Cylinder Owner: LINDE Cylinder Material: Spectra seal Cylinder Size: 40 L

Laboratory Report

Analytical Result

Component	Normal Concentration	Analysis Result ¹	Uncertainty ²	Method of Analysis ³	Assay Date
Nitric Oxide	80.0 ppm	79.5 ppm	± 1% relative	(6) I-PB-352	27-Feb & 7-Mar-23
Other NOx impurity		Less than 3.9 ppm			
Carbon Monoxide In Nitrogen	80.0 ppm	81.1 ppm	± 1% relative	(6) I-PB-352	27-Feb-2023

Reference Standard used in Assay

Reference Standard	Cylinder number	Concentration	Expiry date:
Nitric Oxide	2560035G	50.89 ± 0.41 ppm	13-Dec-2024
Carbon Monoxide In Nitrogen	ND46423	50.20 ± 0.26 ppm	4-May-2024

Analytical Instruments used in Assay

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
FTIR Spectrometers Nicolet iS50	FTIR-NO	27-Jan & 1-Mar-23
FTIR Spectrometers Nicolet iS50	FTIR-CO	22-Feb-2023

Recommend usage condition

Minimum utilization: 5% of actual content or before expire date whichever comes first.
Storage condition: Keep in well ventilation and secure area.

Comments

When reordering, please quote the material number

Note:

1. All results expressed in this report are on mole/mole basis, unless otherwise specified. The Assay of this Standard has been performed in accordance with the EPA Traceability Protocol EPA-600/R-12/531 for the Assay and Certification of Gaseous Calibration Standards using procedure G1.
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3. (1) Gas Chromatography, (2) Paramagnetic Oxygen Analyzer, (3) Electrochemical Oxygen Analyzer, (4) Electrochemical Moisture Analyzer, (5) Total Hydrocarbon Analyzer, (6) Other - Specified

Page 1 of 1

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เลขที่ใบอนุญาตประกอบกิจการ 010733000785

ชั้น 15 อาคารทาวเวอร์ 2/3 หมู่ 14 ถนนบางนา-ตราด กม. 6.5 แขวงบางนา

Bangplee, Samutprakarn 10540 โทรศัพท์ (66) 2338-6100 โทรสาร (66) 2338-6333

โรงงานผลิต: 105 หมู่ 5 ตำบลบางกอบัว อำเภอบางพลี จังหวัดสมุทรปราการ 24180

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Sukanya Parinyasoonorn

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PB-002/F006

Linde (Thailand) Public Company Limited Iss:K/2, 15 Oct 2021

PIC Registration no 010733000785

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Wellgrow Plant: 105 Moo 5, T.Bangsamak, A.Bangpakong, Chachoengsao 24180

Thailand, Tel (66) 38.570-479-93

Fax (66) 38.570-323



High Volume TSP & PM-10 Calibration Data Sheet

Calibration Location : SECOT Co.,Ltd. Calibration Date : Jan 6, 2024
Hi-Vol Pump No. : BH-007 Indicator No. : CM-01
Amb. Temp (°C) : 33 Press (mmHg) : 761
Calibration by : Mr.Suphanut I.

Plate	Indicate (X) (cm.)	True H ₂ O (in.)	Actual Flow (Y) (cfm)	XY	X ²	Remark
18	15.80	13.10	60.21	951.32	249.64	
13	13.20	10.20	53.45	705.54	174.24	
10	10.40	7.80	46.90	487.76	108.16	
7	7.40	5.10	38.17	282.46	54.76	
5	4.80	3.00	29.58	141.98	23.04	
Sum	51.60	39.20	228.31	2,569.06	609.84	

Calibrated by : Suphanut I. Approved by : Wittaya K.



High Volume TSP & PM-10 Calibration Data Sheet

Calibration Location : SECOT Co.,Ltd. Calibration Date : Jan 8, 2024
Hi-Vol Pump No. : BH-031 Indicator No. : CM-01
Amb. Temp (°C) : 34 Press (mmHg) : 757
Calibration by : Mr.Suphanut I.

Plate	Indicate (X) (cm.)	True H ₂ O (in.)	Actual Flow (Y) (cfm)	XY	X ²	Remark
18	18.60	11.60	56.73	1,055.18	345.96	
13	16.00	9.20	50.83	813.28	256.00	
10	13.00	7.00	44.50	578.50	169.00	
7	9.40	4.80	37.07	348.46	88.36	
5	6.20	2.80	28.62	177.44	38.44	
Sum	63.20	35.40	217.75	2,972.86	897.76	

Calibrated by : Suphanut I. Approved by : Wittaya K.



High Volume TSP & PM-10 Calibration Data Sheet

Calibration Location : SECOT Co.,Ltd. Calibration Date : Jan 8, 2024
 Hi-Vol Pump No. : BH-025 Indicator No. : CM-01
 Amb. Temp (°C) : 34 Press (mmHg) : 757
 Calibration by : Mr.Suphanut I.

Plate	Indicate (X) (cm.)	True H ₂ O (in.)	Actual Flow (Y) (cfm)	XY	X ²	Remark
18	14.20	9.50	51.46	730.73	201.64	
13	11.80	7.70	46.61	550.00	139.24	
10	9.00	5.80	40.62	365.58	81.00	
7	5.80	3.70	32.70	189.66	33.64	
5	3.40	2.40	26.59	90.41	11.56	
Sum	44.20	29.10	197.98	1,926.38	467.08	

Calibrated by : Suphanut I. Approved by : Wittaya K.



High Volume TSP & PM-10 Calibration Data Sheet

Calibration Location : SECOT Co.,Ltd. Calibration Date : Jan 6, 2024
 Hi-Vol Pump No. : BH-037 Indicator No. : CM-01
 Amb. Temp (°C) : 30 Press (mmHg) : 761
 Calibration by : Mr.Suphanut I.

Plate	Indicate (X) (cm.)	True H ₂ O (in.)	Actual Flow (Y) (cfm)	XY	X ²	Remark
18	19.80	12.00	57.68	1,142.06	392.04	
13	16.00	9.40	51.36	821.76	256.00	
10	12.60	7.00	44.50	560.70	158.76	
7	8.60	4.40	35.55	305.73	73.96	
5	5.20	2.80	28.62	148.82	27.04	
Sum	62.20	35.60	217.71	2,979.08	907.80	

Calibrated by : Suphanut I. Approved by : Wittaya K.



High Volume TSP & PM-10 Calibration Data Sheet

Calibration Location : SECOT Co.,Ltd. Calibration Date : Jan 8, 2024
 Hi-Vol Pump No. : BH-002 Indicator No. : CM-01
 Amb. Temp (°C) : 34 Press (mmHg) : 757
 Calibration by : Mr.Suphanut I.

Plate	Indicate (X) (cm.)	True H ₂ O (in.)	Actual Flow (Y) (cfm)	XY	X ²	Remark
18	21.60	13.30	60.66	1,310.26	466.56	
13	17.60	10.40	53.96	949.70	309.76	
10	14.00	8.00	47.48	664.72	196.00	
7	9.40	4.90	37.44	351.94	88.36	
5	6.20	3.10	30.04	186.25	38.44	
Sum	68.80	39.70	229.58	3,462.86	1,099.12	

Calibrated by : Suphanut I. Approved by : Wittaya K.



High Volume TSP & PM-10 Calibration Data Sheet

Calibration Location : SECOT Co.,Ltd. Calibration Date : Jan 6, 2024
 Hi-Vol Pump No. : BH-003 Indicator No. : CM-01
 Amb. Temp (°C) : 30 Press (mmHg) : 761
 Calibration by : Mr.Suphanut I.

Plate	Indicate (X) (cm.)	True H ₂ O (in.)	Actual Flow (Y) (cfm)	XY	X ²	Remark
18	18.40	11.30	56.01	1,030.58	338.56	
13	14.80	9.00	50.29	744.29	219.04	
10	12.00	6.90	44.19	530.28	144.00	
7	7.80	4.80	37.07	289.15	60.84	
5	4.80	2.70	28.12	134.98	23.04	
Sum	57.80	34.70	215.68	2,729.28	785.48	

Calibrated by : Suphanut I. Approved by : Wittaya K.



CONTROL UNIT CALIBRATION

(Metric units, mm)

Date 6 Jan 24

Barometric press, Pb

Initial	Final	Average
759	759	759

mmHg

Dry Gas Meter Data

Console No. M50-09

Metering System ID

DGM Number 333249

DGM Model ES-110

Calibrated by : Montri P.

Reference Dry Gas Meter Data

Serial No. 358794

Model S110

Correction factor (Yr) 1.0068

Last Calibration Date 26 Oct 23

Orifice manometer setting, ΔH mm H2O	Ref. DGM Volume V _r , Liters	DGM Volume V _m Liters	Temperature (°C)				Time ⊙ min	DGM Correction factor (Y)	ΔH@ mm
			Ref DGM T _r	Dry Gas Meter					
				Inlet T _i	Outlet T _o	Avg T _m			
12.5	100.3	99.0	25	25	24	24.5	8.53	1.0165	41.1799
25.0	100.0	99.5	25	25	24	24.5	6.08	1.0073	42.0742
50.0	100.1	99.8	25	25	24	24.5	4.47	1.0041	45.2483
76.0	100.4	99.1	25	25	24	24.5	3.55	1.0114	43.2112
100.0	100.1	99.4	25	25	24	24.5	3.55	1.0024	44.6038
150.0	100.1	98.9	25	25	24	24.5	2.57	1.0022	44.8941

Average 1.0073 43.5352

Approved by :



CONTROL UNIT CALIBRATION

(Metric units, mm)

Date 6 Jan 24

Barometric press, Pb

Initial	Final	Average
759	759	759

mmHg

Dry Gas Meter Data

Console No. M50-06

Metering System ID

DGM Number 917415

DGM Model MST-C2-1

Calibrated by : Montri P.

Reference Dry Gas Meter Data

Serial No. 358794

Model S110

Correction factor (Yr) 1.0068

Last Calibration Date 26 Oct 23

Orifice manometer setting, ΔH mm H2O	Ref. DGM Volume V _r , Liters	DGM Volume V _m Liters	Temperature (°C)				Time ⊙ min	DGM Correction factor (Y)	ΔH@ mm
			Ref DGM T _r	Dry Gas Meter					
				Inlet T _i	Outlet T _o	Avg T _m			
12.5	100.2	101.7	25	25	24	24.5	8.87	0.9901	44.4570
25.0	100.1	102.0	25	25	24	24.5	6.52	0.9854	48.0383
50.0	100.3	101.1	25	25	24	24.5	4.72	0.9935	50.1707
76.0	99.3	99.3	25	25	24	24.5	3.70	0.9987	47.9159
100.0	100.1	101.6	25	25	24	24.5	3.70	0.9816	49.8135
150.0	100.2	100.2	25	25	24	24.5	2.67	0.9919	48.1679

Average 0.9902 48.0939

Approved by :



CONTROL UNIT CALIBRATION

(Metric units, mm)

Date 12 Jan 24

Barometric press, Pb

Initial	Final	Average
758	758	758

 mmHg

Dry Gas Meter Data

Console No. M50-07

Metering System ID

DGM Number 90331

DGM Model MST-C2-1

Calibrated by Montri P.

Reference Dry Gas Meter Data

Serial No. 358794

Model S110

Correction factor (Yr) 1.0068

Last Calibration Date 26 Oct 23

Orifice manometer setting, ΔH mm H2O	Ref. DGM Volume V _r Liters	DGM Volume V _m Liters	Temperature (°C)				Time ⊙ min	DGM Correction factor (Y)	ΔH@ mm
			Ref DGM T _r	Dry Gas Meter					
				Inlet T _i	Outlet T _o	Avg T _m			
12.5	100.0	100.6	25	25	24	24.5	9.72	0.9981	53.7523
25.0	100.2	100.2	25	25	24	24.5	6.48	1.0029	47.6709
50.0	100.0	100.8	25	25	24	24.5	4.77	0.9919	51.7327
76.0	100.2	100.9	25	25	24	24.5	3.90	0.9908	52.4606
100.0	100.1	99.6	25	25	24	24.5	3.90	1.0005	53.0627
150.0	100.2	98.9	25	25	24	24.5	2.82	1.0032	54.0289
Average								0.9979	52.1180

Approved by :



PITOT TUBE CALIBRATION

Calibration Location: SECOT

Calibration Duct No.: CD-0123

Calibration Standard Pitot tube data

Pitot No. : Std-02

Type S Pitot No. : PS20-02

Calibration Date : 09-01-2024

Coefficient (Cp) : 0.99

Calibrated by : Mr. Montri P.

A Side Calibration

Run No.	ΔPstd (mm H ₂ O)	ΔPs (mm H ₂ O)	Cp(s)	Deviation, δ Cp(s) - Cp(A)
1	15.00	21.00	0.8367	-0.0068
2	15.00	20.50	0.8468	0.0034
3	15.00	20.50	0.8468	0.0034

C_{P(A),avg} 0.8435

B Side Calibration

Run No.	ΔPstd (mm H ₂ O)	ΔPs (mm H ₂ O)	Cp(s)	Deviation, δ Cp(s) - Cp(B)
1	15.00	21.00	0.8367	0.0000
2	15.00	21.00	0.8367	0.0000
3	15.00	21.00	0.8367	0.0000

C_{P(B),avg} 0.8367

| CP(A)-CP(B) | = 0.0068

C_{P(Avg)} = 0.8401

Approved by :

*** δ must be ≤ 0.01 for the test to be acceptable ***
 *** | Cp(A)-Cp(B) | must also be < 0.01 if average of Cp(A) and Cp(B) is to be used ***

Sheet No. : CAL-PI-PS10-02/2024



PITOT TUBE CALIBRATION

Calibration Location: SECOT

Calibration Date : 09-01-2024

Calibration Duct No.: CD-0123

Calibration Standard Pitot tube data

Pitot No. : Std-02

Coefficient (Cp) : 0.99

Type S Pitot No. : PS10-02

Calibrated by : Mr. Montri P.

A Side Calibration

Run No.	ΔP_{std} (mm H ₂ O)	ΔP_s (mm H ₂ O)	Cp(s)	Deviation, δ Cp(s) - Cp(A)
1	15.00	21.00	0.8367	0.0000
2	15.00	21.00	0.8367	0.0000
3	15.00	21.00	0.8367	0.0000

 $C_{P(A),avg}$ 0.8367

B Side Calibration

Run No.	ΔP_{std} (mm H ₂ O)	ΔP_s (mm H ₂ O)	Cp(s)	Deviation, δ Cp(s) - Cp(B)
1	15.00	21.00	0.8367	0.0000
2	15.00	21.00	0.8367	0.0000
3	15.00	21.00	0.8367	0.0000

 $C_{P(B),avg}$ 0.8367

| CP(A)-CP(B) | = 0.0000

 $C_{P(Avg)}$ = 0.8367Approved by : 

*** δ must be ≤ 0.01 for the test to be acceptable ***
*** | Cp(A)-Cp(B) | must also be < 0.01 if average of Cp(A) and Cp(B) is to be used ***

Sheet No. : CAL-PI-PS20-01/2024



PITOT TUBE CALIBRATION

Calibration Location: SECOT

Calibration Date : 09-01-2024

Calibration Duct No.: CD-0123

Calibration Standard Pitot tube data

Pitot No. : Std-02

Coefficient (Cp) : 0.99

Type S Pitot No. : PS20-01

Calibrated by : Mr. Montri P.

A Side Calibration

Run No.	ΔP_{std} (mm H ₂ O)	ΔP_s (mm H ₂ O)	Cp(s)	Deviation, δ Cp(s) - Cp(A)
1	15.00	21.50	0.8269	-0.0065
2	15.00	21.00	0.8367	0.0033
3	15.00	21.00	0.8367	0.0033

 $C_{P(A),avg}$ 0.8334

B Side Calibration

Run No.	ΔP_{std} (mm H ₂ O)	ΔP_s (mm H ₂ O)	Cp(s)	Deviation, δ Cp(s) - Cp(B)
1	15.00	21.00	0.8367	0.0065
2	15.00	21.50	0.8269	-0.0033
3	15.00	21.50	0.8269	-0.0033

 $C_{P(B),avg}$ 0.8302

| CP(A)-CP(B) | = 0.0033

 $C_{P(Avg)}$ = 0.8318Approved by : 

*** δ must be ≤ 0.01 for the test to be acceptable ***
*** | Cp(A)-Cp(B) | must also be < 0.01 if average of Cp(A) and Cp(B) is to be used ***



ELECTRICAL AND ELECTRONICS INSTITUTE
FOUNDATION FOR INDUSTRIAL DEVELOPMENT

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Phraek Sa, Mueang Samut Prakan, Samut Prakan 10280

Tel: +66 2709 4860 Fax: +66 2324 0917



Certificate No.: CP20240083EA

Operation No.: CP2024020056

Certificate of Calibration

Equipment: Sound Calibrator
Manufacturer: Cirrus Research Plc
Model/Type: CR:515
Serial No.: 94296
ID No.: -
Customer: SECOT Co.,Ltd.
Address: 239 Rimklongprapa Rd., Bangsue,
Bangkok 10800 Thailand
Received Date: 8 February 2024
Calibrated Date: 14 February 2024
Issued Date: 20 February 2024
Calibrated by: Ms. Juntaporn Kunhakom

Approved by: _____

(Mr. Sittichai Swaksuriyawong)
Group Manager

This report was prepared electronically using applicable electronic signature. Printing or copy of file are considered as a copy of the document.

The reported uncertainty of measurement was based on standard uncertainty multiplied by a coverage factor (k) providing a level of confidence of approximately 95%. This certificate may not be reproduced other than in full except with the prior written approval of the Electrical and Electronics Institute, Foundation for Industrial Development.



ELECTRICAL AND ELECTRONICS INSTITUTE
FOUNDATION FOR INDUSTRIAL DEVELOPMENT

Certificate No.: CP20240083EA

Calibration Report

Equipment: Sound Calibrator
Manufacturer: Cirrus Research Plc
Model/Type: CR:515
Serial No.: 94296
ID No.: -
Ambient Temperature: (23 ± 2) °C
Relative Humidity: (50 ± 15) %
Pressure: (101.3 ± 1.5) kPa
Method of Calibration :-
IEC 60942:2017

Condition of this result of calibration

1. Reference standards instrument :-

Instrument	Model	Serial No.	Cert. No.	Due Date
1) Standard microphone	4180	2661000	AA-1006-23	7 June 2024
2) Waveform Generator	33511B	MY52302264	CK20230039EA	27 June 2024
3) Audio Analyzing DMM	2015-P	4079144	E1U231797	23 April 2024
4) Pressure humidity and Temperature Transmitter	PTU301	F0640002	CL1-P230024 CD20230196EA	20 March 2024 23 July 2024

2. This result of calibration was found accurate as shown on date and place of calibration only.

3. This certification is traceable to the international system of unit maintained at :-

- Reference standards instrument for Acoustic function
 - National Institute of Metrology (Thailand)
- Reference standards instrument for Electrical function
 - Electrical and Electronics Institute; NSC Accredited Calibration No.0119

Result of Calibration:-

1. Function : Sound pressure level

Normal	Specified Sound	Measured value	Deviated value ^[1]	Acceptance limit ^[3]
Frequency (Hz)	Pressure level (dB)	(dB)	(dB)	(dB)
1000	94	93.89	-0.11	±0.25

2. Function : Frequency

Normal Sound	Specified Frequency	Measured value	Deviated value ^[2]	Acceptance limit ^[3]
Pressure level (dB)	(Hz)	(Hz)	(%)	(%)
94	1000	1000.34	0.03	±0.70

Certificate No.: CP20240083EA

Calibration Report

3. Function : Total distortion + noise

Normal Sound Pressure level (dB)	Normal Frequency (Hz)	Measured value ^[4] (%)	Acceptance limit ^[5] (%)
94	1000	0.68	2.50

Uncertainty of measurement

Function	Uncertainty	Maximum-permitted uncertainty of measurement
Sound pressure level	0.10 dB	0.15 dB
Frequency	0.10 %	0.20 %
Total distortion + noise	0.40 %	0.50 %

- Note:
- [1] The deviated value is the absolute value of the difference between the measured value and the corresponding specified sound pressure level.
 - [2] The deviated value is the absolute value of the difference in percent between the measured value and the corresponding specified frequency.
 - [3] The acceptance limit is for the deviated value.
 - [4] The measured value is the total distortion + noise, measured over the frequency range from 20 Hz to 20 kHz.
 - [5] The acceptance limit is for the Measured value.
- Remarks:
- 1. Acceptance limit was IEC 60942:2017 Class 1.
 - 2. Maximum-permitted uncertainty of measurement was IEC 60942:2017 Class 1.
 - 3. The coverage factor $k = 2.00$

-- End of Report --



SOUND LEVEL METER CALIBRATION

Calibration Location: SECOT

Calibration Date: Nov 1, 24

ACOUSTIC CALIBRATOR

Brand	Model	Serial No.	Frequency (Hz)	Ref. Calibrated (dB)	Eff. Calibrated (dB)
Cirrus	CR:515	94296	1000.00	94.0	93.7

No.	Brand	Model	Serial No.	Reading (dB)	dB Adjust
15	Cirrus	CR162B	G300769	94.1	-0.4
16	Cirrus	CR162B	G300833	93.9	-0.2
19	Cirrus	CR162B	G300990	93.8	-0.1
36	Cirrus	CR161B	G302630	93.7	0.0
39	Cirrus	CR162B	G302743	92.8	0.9
40	Cirrus	CR162B	G302740	94.0	-0.3
43	Cirrus	CR162B	G302741	93.7	0.0
44	Cirrus	CR162B	G302742	93.7	0.0
45	Cirrus	CR161B	G303385	93.7	0.0
50	Cirrus	CR162B	G302333	93.3	0.4
57	Cirrus	CR161B	G303827	93.7	0.0

Calibrated by :



Approved by :

Prada S.



SOUND LEVEL METER CALIBRATION

Calibration Location: SECOT

Calibration Date: Aug 6, 24

ACOUSTIC CALIBRATOR

Brand	Model	Serial No.	Frequency (Hz)	Ref.Calibrated (dB)	Eff.Calibrated (dB)
Cirrus	CR:515	94296	1000.00	94.0	93.8

No.	Brand	Model	Serial No.	Reading (dB)	dB Adjust
1	SCARLET	ST-21D	820722	93.8	0.0
2	SCARLET	ST-21D	820723	93.8	0.0
4	SCARLET	ST-21D	820725	93.8	0.0
5	SCARLET	ST-21D	820726	93.8	0.0
6	SCARLET	ST-21D	820727	93.8	0.0
7	SCARLET	ST-21D	820728	93.8	0.0
8	SCARLET	ST-21D	820729	93.8	0.0

Calibrated by :

Approved by :



SOUND LEVEL METER CALIBRATION

Calibration Location: SECOT

Calibration Date: Aug 6, 24

ACOUSTIC CALIBRATOR

Brand	Model	Serial No.	Frequency (Hz)	Ref.Calibrated (dB)	Eff.Calibrated (dB)
Cirrus	CR:515	94296	1000.00	94.0	93.7

No.	Brand	Model	Serial No.	Reading (dB)	dB Adjust
42	Cirrus	CR162B	G302738	93.8	-0.1

Calibrated by :

Approved by :



SOUND LEVEL METER CALIBRATION

Calibration Location: SECOT

Calibration Date: Nov 19, 24

ACOUSTIC CALIBRATOR

Brand	Model	Serial No.	Frequency (Hz)	Ref. Calibrated (dB)	Eff. Calibrated (dB)
Cirrus	CR:515	94296	1000.00	94.0	93.8

No.	Brand	Model	Serial No.	Reading (dB)	dB Adjust
1	SCARLET	ST-21D	820722	93.8	0.0
2	SCARLET	ST-21D	820723	93.7	0.1
4	SCARLET	ST-21D	820725	93.8	0.0
5	SCARLET	ST-21D	820726	93.8	0.0
6	SCARLET	ST-21D	820727	93.8	0.0
7	SCARLET	ST-21D	820728	93.8	0.0
8	SCARLET	ST-21D	820729	93.8	0.0
10	SCARLET	ST-21D	820731	93.7	0.1

Calibrated by :

Approved by :

CERTIFICATE OF CALIBRATION

ISSUED BY Noisemeters

DATE OF ISSUE 26 March 2024

CERTIFICATE NUMBER 211259

NoiseMeters

NoiseMeters
Acoustic House
Bridlington Road
Hunmanby
YO14 0PH
United Kingdom
www.noisemeters.com

Page 1 of 2

Approved signatory
N.Smith
Electronically signed:

doseBadge Reader : IEC 60942:2003

Instrument information

Manufacturer: Cirrus Research plc
Model: RC:110A
Serial number: 95167
Class: 2

Notes:

Test summary

Date of calibration: 25 March 2024

The doseBadge reader detailed above has been calibrated to the published data as described in the operating manual and in the half-inch configuration. The procedures and techniques used are as described in IEC60942_2003 Annex B – Periodic Tests and three determinations of the sound pressure level, frequency and total distortion were made.

The sound pressure level was measured using a WS2F condenser microphone type MK:224 manufactured by Cirrus Research plc.

The results have been corrected to the reference pressure of 101.33 kPa using the manufacturer's data.

The doseBadge Reader has been shown to conform to the Class 2 requirements for periodic testing, described in Annex B of IEC 60942:2003 for the sound pressure level(s) and frequency(ies) stated, for the environmental conditions under which the tests were performed.

However, as public evidence was not available, from a testing organisation responsible for pattern approval, to demonstrate that the model of doseBadge Reader conformed to the requirements for pattern evaluation described in Annex A of IEC 60942:2003, no general statement or conclusion can be made about conformance of the doseBadge Reader to the requirements of IEC 60942:2003.

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 Number:

211259

Page 2 of 2

Environmental conditions

The following conditions were recorded at the time of the test:

Before Pressure: 99.26 kPa Temperature: 22.1 °C Humidity: 33.4 %
After Pressure: 99.26 kPa Temperature: 22.1 °C Humidity: 34.6 %

Test equipment

Equipment	Manufacturer	Model	Serial number
Distortion Meter	Keithley	2015	0839263
Acoustic Calibrator	Bruel and Kjaer	4231	2610257
Environmental Monitor	Comet	T7510	21962628

Initial Acoustic Results

	Expected	Sample 1	Sample 2	Sample 3	Average	Deviation	Tolerance	Uncertainty
Level (dB)	114.00	113.41	113.54	113.55	113.50	-0.50	±0.75	0.11 dB
Distortion (%)	< 4.00	0.49	0.50	0.55	0.51	0.51	+4.00	0.13 %
Frequency (Hz)	1000.0	990.5	990.5	990.4	990.5	-9.5	±20.0	0.1 Hz

The measured quantities or deviations (as applicable), extended by the expanded combined uncertainty of measurement, must not exceed the corresponding tolerance.

Adjusted Acoustic Results

	Expected	Sample 1	Sample 2	Sample 3	Average	Deviation	Tolerance	Uncertainty
Level (dB)	114.00	113.99	113.99	113.98	113.99	-0.01	±0.75	0.11 dB
Distortion (%)	< 4.00	0.42	0.41	0.41	0.42	0.42	+4.00	0.13 %
Frequency (Hz)	1000.0	990.3	990.4	990.3	990.4	-9.6	±20.0	0.1 Hz

Functionality Results

Function	Result
Keypad	Pass
Battery Power	Pass
Display	Pass
Communication	Pass
2 way IR link	Pass
Clock	Pass

End of results

Sheet No. : NC-CIRRUS-2024-123



NOISE DOSE METER CALIBRATION

Calibration Location: SECOT

Calibration Date: Aug 6, 24

ACOUSTIC CALIBRATOR

Brand	Model	Serial No.	Calibrated (dB)	Frequency (Hz)
CIRRUS	RC 110A	95167	114.00	1000

No.	Brand	Model	Serial No.	Reading (dB)	dB Adjust
1	Cirrus	CR110A	CB1047	113.3	0.7
2	Cirrus	CR110A	CB1050	113.9	0.1
3	Cirrus	CR110A	CB1053	114.1	-0.1
4	Cirrus	CR110A	CB1054	114.0	0.0

Calibrated by :

Approved by :



NOISE DOSE METER CALIBRATION

Calibration Location: SECOT

Calibration Date: Sep 11, 24

ACOUSTIC CALIBRATOR

Brand	Model	Serial No.	Calibrated (dB)	Frequency (Hz)
CIRRUS	RC 110A	95167	114.00	1000

No.	Brand	Model	Serial No.	Reading (dB)	dB Adjust
1	Cirrus	CR110A	CB1101	113.6	0.4
2	Cirrus	CR110A	CB1102	114.1	-0.1
3	Cirrus	CR110A	CB1103	114.0	0.0

Calibrated by :

Approved by :



NOISE DOSE METER CALIBRATION

Calibration Location: SECOT

Calibration Date: Nov 19, 24

ACOUSTIC CALIBRATOR

Brand	Model	Serial No.	Calibrated (dB)	Frequency (Hz)
CIRRUS	RC 110A	95167	114.00	1000

No.	Brand	Model	Serial No.	Reading (dB)	dB Adjust
1	Cirrus	CR110A	CB1041	112.5	1.5
2	Cirrus	CR110A	CB1042	113.9	0.1
3	Cirrus	CR110A	CB1050	113.8	0.2
4	Cirrus	CR110A	CB1052	114.0	0.0

Calibrated by :

Approved by :

CERTIFICATE OF CALIBRATION

ISSUED BY **Noisemeters**

DATE OF ISSUE **29 April 2024**

CERTIFICATE NUMBER **213338**

NoiseMeters

NoiseMeters
Acoustic House
Bridlington Road
Hunmanby
YO14 0PH
United Kingdom
www.noisemeters.com

Page 1 of 2

Approved signatory
N.Smith
Electronically signed:



doseBadge Reader : IEC 60942:2003

Instrument information

Manufacturer: Pulsar Instruments

Notes:

Model: Model 22R

Serial number: 79781

Class: 2

Test summary

Date of calibration: 29 April 2024

The doseBadge reader detailed above has been calibrated to the published data as described in the operating manual and in the half-inch configuration. The procedures and techniques used are as described in IEC60942_2003 Annex B – Periodic Tests and three determinations of the sound pressure level, frequency and total distortion were made.

The sound pressure level was measured using a WS2F condenser microphone type MK:224 manufactured by Cirrus Research plc.

The results have been corrected to the reference pressure of 101.33 kPa using the manufacturer's data.

The doseBadge Reader has been shown to conform to the Class 2 requirements for periodic testing, described in Annex B of IEC 60942:2003 for the sound pressure level(s) and frequency(ies) stated, for the environmental conditions under which the tests were performed.

However, as public evidence was not available, from a testing organisation responsible for pattern approval, to demonstrate that the model of doseBadge Reader conformed to the requirements for pattern evaluation described in Annex A of IEC 60942:2003, no general statement or conclusion can be made about conformance of the doseBadge Reader to the requirements of IEC 60942:2003.

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 Number:
213338

Page 2 of 2

Environmental conditions

The following conditions were recorded at the time of the test:

Before Pressure: 100.34 kPa Temperature: 22.4 °C Humidity: 38.5 %

After Pressure: 100.34 kPa Temperature: 22.7 °C Humidity: 36.3 %

Test equipment

Equipment	Manufacturer	Model	Serial number
Distortion Meter	Keithley	2015	0839263
Acoustic Calibrator	Bruel and Kjaer	4231	2610257
Environmental Monitor	Comet	T7510	21962628

Initial Acoustic Results

	Expected	Sample 1	Sample 2	Sample 3	Average	Deviation	Tolerance	Uncertainty
Level (dB)	114.00	113.94	113.93	113.94	113.94	-0.06	±0.75	0.11 dB
Distortion (%)	< 4.00	0.49	0.49	0.49	0.49	0.49	+4.00	0.13 %
Frequency (Hz)	1000.0	998.9	998.9	998.9	998.9	-1.1	±20.0	0.1 Hz

The measured quantities or deviations (as applicable), extended by the expanded combined uncertainty of measurement, must not exceed the corresponding tolerance.

Adjusted Acoustic Results

	Expected	Sample 1	Sample 2	Sample 3	Average	Deviation	Tolerance	Uncertainty
Level (dB)	114.00	114.01	113.98	113.98	113.99	-0.01	±0.75	0.11 dB
Distortion (%)	< 4.00	0.49	0.49	0.49	0.49	0.49	+4.00	0.13 %
Frequency (Hz)	1000.0	998.9	999.0	998.9	998.9	-1.1	±20.0	0.1 Hz

Functionality Results

Function	Result
Keypad	Pass
Battery Power	Pass
Display	Pass
Communication	Pass
2 way IR link	Pass
Clock	Pass

End of results



NOISE DOSE METER CALIBRATION

Calibration Location: SECOT

Calibration Date: Dec 19, 24

ACOUSTIC CALIBRATOR

Brand	Model	Serial No.	Calibrated (dB)	Frequency (Hz)
PULSAR	22R	79781	114.00	1000

No.	Brand	Model	Serial No.	Reading (dB)	dB Adjust
1	Pulsar	22	PB614	114.2	-0.2
2	Pulsar	22	PB632	112.1	1.9

Calibrated by :

Approved by :



Request Service No.100/67

Page 1 of 3

Calibration Certificate

Nomenclature : Brand : Sartorius Type : Top-Loading Electronic Balance

Model : BSA224S-CW Serial No. : 32191636

Submitted by : Laboratory of SECOT CO., LTD.

Location of Calibration : BAL Room , 6th Floor, Secot Co., Ltd.

Calibration range : 0 – 200 g

Scale division : 0.0001 g (220 g)

Calibration date : May 22,2024

Reference Standard No. M2402083S, M2302167S, M2403062N, M2303005N

Traceable to : Thai Calibration services Co.,Ltd

Ambient Condition : Temperature 23.41-24.71 °C

Humidity 48.2-53.1 % RH

Calibrated By :

(Miss Khemchuda Insorn)

Approved By :

(Miss Narisa Poowasanetch)

Testing Officer

Chief of Technical Management

Date :

23/05/2024

Date :

23/05/2024

Issued Date : May 23,2024

Measurement Report

Request Service No.100/67

Page 2 of 3

Description : Brand : Sartorius

Type : Top-Loading Electronic Balance

Model : BSA224S-CW

Serial No. : 32191636

Calibration range : 0 – 200 g

Scale division : 0.0001 g (220 g)

Calibration date : May 22,2024

Ambient Condition : Temperature 23.41-24.71 °C Relative humidity 48.2-53.1 % RH

Measurement data :

1. Repeatability of Reading :

Load (g)	Standard Deviation of Reading (g)	Maximum Difference between Successive Reading (g)
50	0.00007	0.0002
100	0.00005	0.0001
150	0.00005	0.0001
200	0.00005	0.0001

2. Off-Center Loading :

A Mass of 50.0000 g was placed and moved to various position on the pan.

Unit : g

Center	Front	Left	Back	Right	Center	Maximum Difference
49.99990	49.99992	49.99988	49.99992	49.99990	49.99992	0.00004

Issued Date : May 24,2024

Request Service No. 100/67

Page 3 of 3

3. Departure from Nominal Value :

Reading (g)	Correction (g)	Uncertainty (+/- g)
0	0.00000	± 0.00007
1	+ 0.00003	± 0.00007
5	+ 0.00004	± 0.00008
10	+ 0.00008	± 0.00008
20	+ 0.00003	± 0.00009
40	+ 0.00012	± 0.00010
60	+ 0.00004	± 0.00012
80	+ 0.00005	± 0.00013
100	+ 0.00006	± 0.00016
120	+ 0.00007	± 0.00018
140	+ 0.00008	± 0.00020
160	+ 0.00006	± 0.00022
180	+ 0.00007	± 0.00024
200	+ 0.00010	± 0.00027

Calibrated by : *Khemchuda Inorn* Approved By : *Naris Poowasanpetch*

(Miss Khemchuda Inorn)

(Miss Narisa Poowasanpetch)

Testing Officer

Chief of Technical Management

Date : *23/05/2024*

Date : *23/05/2024*

Issued Date : May 23,2024



Request Service No. 099/67

Page 1 of 3

Calibration Certificate

Nomenclature : Brand : Mettler Toledo Type : Top-Loading Electronic Balance

Model : AG245 Serial No. : 1117293916 (198129-0)

Submitted by : Laboratory of SECOT CO., LTD.

Location of Calibration : BAL Room , 6th Floor, Secot Co., Ltd.

Calibration range : 0 – 200 g Scale division : 0.00001 g (41g)/ 0.0001 g (210g)

Calibration date : May 24, 2024

Reference Standard No. M2310081S, M2402083S, M2302167S, M2403062N, M2303005N

Traceable to : Metrological Center SCI ECO Services Company Limited.

Thai Calibration Services CO., LTD.

Ambient Condition : Temperature 24.20 – 24.70 °C

Humidity 50.70 – 52.00 % RH

Calibrated By : *Pornnapha Budthum*

(Miss Pornnapha Budthum)

Testing Officer

Date : 25/05/2024

Approved By : *Narisa Poowasanpetch*

(Miss Narisa Poowasanpetch)

Chief of Technical Management

Date : 25/05/2024

Issued Date : May 25, 2024

Measurement Report

Request Service No. 099/67

Page 2 of 3

Description : Brand : Mettler Toledo

Type : Top-Loading Electronic Balance

Model : AG245

Serial No. : 1117293916 (198129-0)

Calibration range : 0 – 200 g

Scale division : 0.00001 g (41g)/ 0.0001 g (210g)

Calibration date : May 24, 2024

Ambient Condition : Temperature 24.20-24.70 °C Relative humidity 50.70-52.00 % RH

Measurement data :

1. Repeatability of Reading :

Load (g)	Standard Deviation of Reading (g)	Maximum Difference between Successive Reading (g)
50	0.000125	0.0004
100	0.000105	0.0003
150	0.000125	0.0003
200	0.000173	0.0005

2. Off-Center Loading :

A Mass of 50.0000 g was placed and moved to various position on the pan.

Unit : g

Center	Front	Left	Back	Right	Center	Maximum Difference
50.00010	50.00032	50.00048	50.00002	50.00008	50.00020	0.00038

Issued Date : May 25, 2024

3. Departure from Nominal Value :

Reading (g)	Correction (g)	Uncertainty (+/- g)
0	0.000000	± 0.000034
0.5	0.000022	± 0.000033
1	0.000037	± 0.000018
10	-0.000067	± 0.000036
20	-0.000060	± 0.000044
40	-0.000193	± 0.000072
60	-0.00032	± 0.00011
80	-0.00033	± 0.00013
100	-0.00048	± 0.00015
120	-0.00049	± 0.00017
140	-0.00040	± 0.00022
160	-0.00054	± 0.00023
180	-0.00053	± 0.00024
200	-0.00084	± 0.00027

Calibrated by : *Pornnapha Budthum*

(Miss Pornnapha Budthum)

Testing Officer

Date : 25/05/2024

Approved By : *Narisa Poowasanpetch*

(Miss Narisa Poowasanpetch)

Chief of Technical Management

Date : 25/05/2024

Issued Date : May 25, 2024



Calibration Certificate

Nomenclature : Brand : Mettler Toledo Type : Top-Loading Electronic Balance

Model : AB204-S Serial No. : 1123163292 (209359)

Submitted by : Laboratory of SECOT CO., LTD.

Location of Calibration : BAL Room , 6th Floor, Secot Co., Ltd.

Calibration range : 0 – 200 g Scale division : 0.0001 g (220 g)

Calibration date : May 24, 2024

Reference Standard No. M2402083S, M2302167S, M2403062N, M2303005N

Traceable to : THAI CALIBRATION SERVICES CO., LTD.

Ambient Condition : Temperature 24.21 – 24.41 °C

Humidity 41.8 – 49.5 % RH

Calibrated By : *Janista Kui-on*

(Miss Janista Kui-on)

Testing Officer

Date : 24/05/2024

Approved By : *Narisa Poowasanpetch*

(Miss Narisa Poowasanpetch)

Chief of Technical Management

Date : 24/05/2024

Issued Date : May 24, 2024

Measurement Report

Request Service No. 101/67

Page 2 of 3

Description : Brand : Mettler Toledo

Type : Top-Loading Electronic Balance

Model : AB204-S

Serial No. : 1123163292 (209359)

Calibration range : 0 – 200 g

Scale division : 0.0001 g (220 g)

Calibration date : May 24,2024

Ambient Condition : Temperature 24.21-24.41 °C Relative humidity 41.8-49.5 % RH

Measurement data :

1. Repeatability of Reading :

Load (g)	Standard Deviation of Reading (g)	Maximum Difference between Successive Reading (g)
50	0.00005	0.0001
100	0.00004	0.0001
150	0.00007	0.0002
200	0.00007	0.0002

2. Off-Center Loading :

A Mass of 50.0000 g was placed and moved to various position on the pan.

Unit : g

Center	Front	Left	Back	Right	Center	Maximum Difference
50.00016	50.00016	50.00028	50.00014	50.00010	50.00012	0.00016

Issued Date : May 24,2024

Request Service No.101/67

Page 3 of 3

3. Departure from Nominal Value :

Reading (g)	Correction (g)	Uncertainty (+/- g)
0	0.00000	± 0.00007
1	+0.00003	± 0.00007
5	+0.00002	± 0.00008
10	-0.00004	± 0.00008
20	-0.00003	± 0.00009
40	-0.00002	± 0.00010
60	-0.00016	± 0.00012
80	-0.00021	± 0.00014
100	-0.00020	± 0.00016
120	-0.00023	± 0.00018
140	-0.00030	± 0.00020
160	-0.00034	± 0.00022
180	-0.00037	± 0.00024
200	-0.00022	± 0.00027

Calibrated by : Janista Kui-on

Approved By : Narin Poowasanpet

(Miss Janista Kui-on)

(Miss Narisa Poowasanpetch)

Testing Officer

Chief of Technical Management

Date : 24/05/2024

Date : 24/05/2024

Issued Date : May 24,2024



Bangkok High Lab Co.,Ltd.
4/176 Soi Ladplakao 66, Ladplakao Rd., Anusawari, Bangkok, Bangkok 10220
Tel: (662) 971-5800 Fax: (662) 971-5300
Website: www.bangkokhighlab.com E-mail: info@bangkokhighlab.com



CERTIFICATE OF CALIBRATION

Certificate No : S2024/033

Page : 1/5

Order No : 010/2024

Customer : SECOT COMPANY LIMITED
Address : 239 Rimklongprapa Road, Bangsue, Bangkok 10800, Thailand
Instrument : UV/VIS spectrophotometer
Manufacture : Thermo Scientific
Model : Genesys 150 UV-VIS
Serial Number : 9A5Y332022
Environment : Temperature (25.1 - 24.8) °C
Humidity (52 - 55) %RH
Received Date : February 20, 2024
Calibration Date : February 20, 2024
Issued Date : February 22, 2024
Calibrate Status : No Adjustment
Calibration Area : Customer area
Roomname : Laboratory Room of SECOT COMPANY LIMITED

Calibrated By : Pacharapol
(Mr. Pacharapol Kwanbang)
Calibration Engineer

Approved By : Teerasak
(Mr. Teerasak Auiphat)
Authorized signatory

This calibration certificate shall not be reproduced other than in full except with the prior written approval of the Bangkok High Lab Co.,Ltd.



Bangkok High Lab Co.,Ltd.
4/176 Soi Ladplakao 66, Ladplakao Rd., Anusawari, Bangkok, Bangkok 10220
Tel: (662) 971-5800 Fax: (662) 971-5300
Website: www.bangkokhighlab.com E-mail: info@bangkokhighlab.com



Certificate No : S2024/033

Page : 2/5

1. Photometric Accuracy

CRMs: Neutral Density Glass Filters

CRMs Serial Number: 10563

Traceability: Traceable to NIST, U.S.A. through Neutral density filters NIST SRM 930e & 1930, Double Aperture method through Starna certificate report no.113594

Spectral slit width : 2.00 nm

1.1 Reading scale at 420.0 nm

Filter STDs (Abs) Certificate	Average Measured Value (A)	Correction (A)	Uncertainty ± (A)
0.0000	0.000	0.0000	0.0028
0.5604	0.559	0.0014	0.0044
1.0723	1.073	-0.0007	0.0038
2.1753	2.179	-0.0037	0.0064

1.2 Reading scale at 440.0 nm

Filter STDs (Abs) Certificate	Average Measured Value (A)	Correction (A)	Uncertainty ± (A)
0.0000	0.000	0.0000	0.0028
0.5503	0.548	0.0023	0.0040
1.0467	1.047	-0.0003	0.0040
2.1117	2.114	-0.0023	0.0064

1.3 Reading scale at 465.0 nm

Filter STDs (Abs) Certificate	Average Measured Value (A)	Correction (A)	Uncertainty ± (A)
0.0000	0.000	0.0000	0.0028
0.4996	0.498	0.0016	0.0034
0.9649	0.963	0.0019	0.0040
1.9646	1.966	-0.0014	0.0060

1.4 Reading scale at 546.1 nm

Filter STDs (Abs) Certificate	Average Measured Value (A)	Correction (A)	Uncertainty ± (A)
0.0000	0.000	0.0000	0.0028
0.5136	0.511	0.0026	0.0028
0.9765	0.976	0.0005	0.0028
1.9848	1.984	0.0008	0.0064



Certificate No : S2024/033
Page : 3/5

1.5 Reading scale at 590.0 nm

Filter STDs (Abs) Certificate	Average Measured Value (A)	Correction (A)	Uncertainty ± (A)
0.0000	0.000	0.0000	0.0028
0.5424	0.540	0.0024	0.0029
1.0130	1.011	0.0020	0.0029
2.0238	2.021	0.0028	0.0061

1.6 Reading scale at 635.0 nm

Filter STDs (Abs) Certificate	Average Measured Value (A)	Correction (A)	Uncertainty ± (A)
0.0000	0.000	0.0000	0.0028
0.5265	0.524	0.0025	0.0030
0.9667	0.963	0.0037	0.0031
1.9145	1.910	0.0045	0.0062

2. Photometric Accuracy

CRMs: Potassium Dichromate in Perchloric acid

CRMs Serial Number: 109966

Blank Serial Number: 110516

Traceability: Traceable to NIST, U.S.A. through crystalline potassium dichromate NIST SRM 935a through Starna certificate report no.113596

Spectral slit width : 2.00 nm

Wavelength (nm)	Certificate (Abs)	Average Measured Value (A)	Correction (A)	Uncertainty ± (A)
235	0.0000	0.000	0.0000	0.0050
	0.7428	0.738	0.0048	0.0056
257	0.0000	0.000	0.0000	0.0050
	0.8605	0.856	0.0045	0.0055
313	0.0000	0.000	0.0000	0.0050
	0.2885	0.288	0.0005	0.0054
350	0.0000	0.000	0.0000	0.0050
	0.6376	0.635	0.0026	0.0056



Certificate No : S2024/033
Page : 4/5

3. Wavelength Accuracy

Spectral slit width : 2.00 nm

3.1 CRMs: Holmium Glass Filter

CRMs Serial Number: 10763

Traceability: Traceable to NIST Holmium oxide filter NIST SRM 2034, through Starna certificate report no. 113607

Filter STDs (nm) Certificate	Average Measured Value (nm)	Correction (nm)	Uncertainty ± (nm)
241.74	241.301	0.439	0.12
279.44	279.243	0.197	0.12
287.98	287.555	0.425	0.12
334.10	333.778	0.322	0.12
361.00	360.913	0.087	0.12
418.61	418.457	0.153	0.12
453.63	453.543	0.087	0.12
460.05	459.911	0.139	0.12
536.66	536.327	0.333	0.12
637.98	637.449	0.531	0.12

3.2 CRMs: Didymium Glass Filter

CRMs Serial Number: 10764

Traceability: Traceable to NIST Didymium filter NIST SRM 2034, through Starna certificate report no. 113608

Filter STDs (nm) Certificate	Average Measured Value (nm)	Correction (nm)	Uncertainty ± (nm)
585.29	584.949	0.341	0.12
684.49	683.901	0.589	0.12
740.18	739.646	0.534	0.12
748.48	747.844	0.636	0.12
807.03	806.832	0.198	0.12
879.27	878.923	0.347	0.12

Certificate No : S2024/033
Page : 5/5

4. *Stray Light

CRMs: Potassium Chloride aqueous solution

CRMs Serial Number: 14912

Blank Serial Number: 14958

Traceability: Traceable to NIST, U.S.A. potassium chloride NIST SRM2032, through Starna certificate report no.113597

Spectral slit width : 2.00 nm

Wavelength (nm)	Certificate	Average Measured
201.13	>2A	2.0170
201.13	<1%T	0.9818

5. *Spectral Resolution

CRMs: Toluene in Hexane

CRMs Serial Number: 14812

Blank Serial Number: 14803

Traceability: Traceable to toluene in hexane NIST SRM2034, through Starna certificate report no. 113598

Spectral slit width (nm)	Abs Ratio
0.5	#N/A
1.0	#N/A
1.5	#N/A
2.0	1.401
3.0	#N/A

Note : * "Not TISI Accredited" in this certificate have been included for completeness

Remark: 1. Calibrate Method

- 1.1 Photometric and Wavelength accuracy: In-house method W-SER-001 based on ASTM E925-02 and ASTM E275-01
- 1.2 Stray light: Measuring the CRMs in both absorbance and transmittance unit at wavelength 201.23 nm. Base on European Pharmacopoeia V.6.19.3 1984
- 1.3 Spectral resolution: Measuring the CRMs. The maximum absorbance values were read at closest to 268.7nm and the minimum absorbance values were read at closest 267.0 nm. Refer to European Pharmacopoeia V.6.19.3 1984
2. N/A = not available.
3. Uncertainty of Measurement: The reported uncertainty of measurement was based on standard uncertainty multiplied by a coverage factor $k = 2$, providing a level of confidence of approximately 95%.
4. This result of calibration was found accurate as shown on date and place of calibration only.
5. This report will certify of calibrated equipment only.

- End of Report -


Calibration Certificate

Certificate No.: 2402881-001-01
Client name: SECOT CO., LTD.
Address: 239 Rimklongprapa Road, Bangsue,
Bangsue, Bangkok 10800

Page 1 of 3

Equipment:	CHAMBER (Hot Air Oven)
Manufacturer:	MEMMERT
Model:	UF55
Serial No.:	B213.0295
ID No.:	N/A
Order No.:	2402881
Operation No.:	2402881-001
Date of Receipt:	24 May 2024
Date of Calibration:	24 May 2024

Calibrated by Mr.Pheraphat Tuanjit
Scientist

Approved by 
(Miss Preeyaporn Jaengkarnkit)
Vice President, Department of Laboratory Services
Responsible for the Technical Management Team

Date of Issue: 30 May 2024

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 standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the National Food Institute.

F-CS-009 Revision: 01 Date: 20-04-65



Calibration Report

Certificate No.: 2402881-001-01
Equipment: CHAMBER (Hot Air Oven)
Model: UF55 Serial No.: B213.0295
Resolution: 0.1 °C ID No.: N/A
Manufacturer: MEMMERT
Date of Calibration: 24 May 2024

Page 2 of 3

Location: Laboratory, SECOT CO., LTD.
Environment Condition:
Ambient Temperature (31.0 ± 1) °C
Relative Humidity (68 ± 5) %
Line Voltage (220 ± 3) Volt

Condition of this results of Calibration:

- This instrument was calibrated by insert 9 standard thermometer into its chamber and calibration according to W-TE-014 Based on TLAS G-20-1/02-08 (E): Guidelines for Calibration and Checks of Temperature Controlled Enclosures.
- The temperature scale used was based on ITS - 90.
- All data show below were final values and the initial data may be obtained upon request.

2. Reference Standard Instrument :

Instrument	Model	Serial No./ID No.	Certificate No.	Due Date	Through
Digital Thermometer with sensor	34972A	MY59003377	TE 670223-01	13 January 2025	NATIONAL FOOD INSTITUTE
	RTD	CH#101-109/ RTD#101-109			

- This certificate is traceable to International System of Units (SI Units).
- This certificate was certified only for the instrument we calibrated.
- This result of calibration was found accurate as shown on date and place of calibration only.

6. Condition of Calibrated item : Good

UUC Description :

Time of Record 1 Hour 9 Minute At 80.0, 104.0 and 180.0 °C
Fresh air Damper - Open Position -
X Close Fan 60%
- Not Available

7. Result of Calibration : ☒ Without adjustment ☐ After adjustment

F-CS-012 Revision: 01 Date: 20-04-65



nfi.or.th

Calibration Report

Certificate No.: 2402881-001-01
Equipment: CHAMBER (Hot Air Oven)
Model: UF55 Serial No.: B213.0295
Resolution: 0.1 °C ID No.: N/A
Manufacturer: MEMMERT
Date of Calibration: 24 May 2024

Page 3 of 3

Calibration point: 80.0, 104.0 and 180.0 °C

Calibration result:

Calibration Condition	Temperature (°C)	Relative Humidity (%)	Line Voltage (Volt)
MIN	30.7	63.6	217.0
MAX	31.4	73.1	223.0

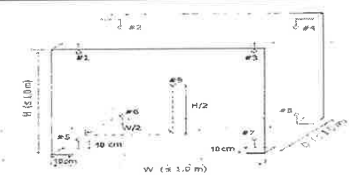


Table1 : Reporting of Temperature

Calibration point (°C)	Measured Temperature (°C) @ Sensor No. (Sensor No.9 is REF)									Uncertainty ± (°C)
	# 1	# 2	# 3	# 4	# 5	# 6	# 7	# 8	# 9	
80.0	79.99	79.94	80.08	80.08	80.13	79.95	79.90	80.17	80.13	0.46
104.0	103.86	103.80	104.00	103.99	104.10	103.83	103.81	104.18	104.10	0.53
180.0	179.73	179.73	180.01	180.00	180.44	179.81	180.20	180.56	180.25	0.90

Table 2 : Reporting of Characterization Result

UUC* Setting (°C)	UUC* reading (°C)			Stability ± (°C)	Uniformity (°C)	Overall Variation (°C)
	MIN	MAX	Average			
80.0	80.0	80.0	80.0	0.06	0.23	0.37
104.0	104.0	104.0	104.0	0.10	0.30	0.53
180.0	180.0	180.0	180.0	0.10	0.52	0.98

Note The quoted uncertainty include " Stability " and " Loading effect (20% of Temp Uniformity) "

UUC* = Unit Under Calibration

Stability = One-half of the greatest maximum difference of measured temperatures at any one sensors, for at least half an hour after reaching steady state.

Uniformity = The maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time.

Overall Variation = The difference of the maximum and minimum measured temperatures throughout observation time.

The report uncertainty of measurement was based on standard uncertainty multiplied by coverage factor k= 2, providing a level of confidence of approximately 95 %.

----- End -----

F-CS-012 Revision: 01 Date: 20-04-65



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TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250
TEL.0-2717-3000-29 FAX.0-2719-9484



Certificate of Calibration

Cert.No.: 24CH1275
Page.: 1 of 3

Equipment : pH Meter
Manufacturer : Mettler Toledo
Model : Seven2Go
Serial No. : C033160713
ID No. : ID.20
Condition As-Received: Used Item
Received Date : 08 October 2024
Calibration Date : 09 October 2024
Reference : 2410-0258DN-3
Submitted by : Secot Co.,Ltd.
239 Rimklongprapa Road,
Bangsue, Bangkok 10800

Ambient Temperature : $(25 \pm 2.5) ^\circ\text{C}$
Relative Humidity : $(50 \pm 15) \%$
Calibration Procedure : In - house method :
- CP-CH5 by direct measurement with DC voltage
standard and direct measurement with
certified reference material (CRM)
- CP-CH8 by comparison with temperature standard

Calibrated by : Warakorn Lerngagtrakul

Saithip

Approved by :

Approved Signatory

() Unnopphol Harachai
() Ponpan Paipim
(✓) Saithip Meangmai

Issue Date : 10 October 2024

The Uncertainties are for a confidence probability of approximately 95%

This certificate may not be reproduced other than in full, except with the prior written
Approval of the head of Corporate Services 3 : Equipment Calibration and Testing Services.



Cert.No.: 24CH1275
Page.: 2 of 3

Condition of this calibration result

1. Reference Standard Instrument

Instrument	Serial No.	ID No.	Cert. No.	Due Date
1)Document Process Calibrator	54030049	130RC116	24E2759	25 Aug 2025
2)Ref. Standard Thermometer	4982054	110RC044	24I757	14 July 2025

- This Certification is traceable to SI Through Technology Promotion Association (Thailand - Japan)

2. Certified Reference Materials :The measurement results are traceable to SI through Hach Lenge GmbH Ltd.,
Deutsche Akkreditierungsstelle, Accredited No.D-RM-15184-01-00
: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	1034203	27 Sep 2026
pH 6.999	Hach Lenge GmbH	C03145	28 Feb 2026
pH 9.997	CPA chem	970853	25 Apr 2025

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 Document Process Calibrator at pH (4,7,10)

Unit Under Calibration	Nominal Value	Standard Voltage Input	Actual Reading		Uncertainty of Measurement ($\pm\text{mV}$)	Coverage factor <i>k</i>
	pH	mV	mV	pH		
pH Meter	4.00	177.48	178	4.00	0.58	2.00
S/N.: C033160713	7.00	0.00	0	7.00	0.58	2.00
	10.00	-177.48	-177	10.00	0.58	2.00



Cert.No.: 24CH1275
Page.: 3 of 3

Calibration Results

Function : pH Measurement

Performing three buffers standard curve by using buffer nominal pH (4,7,10)

Unit Under Calibration	Standard pH Buffer Solution	Actual pH Reading	Actual mV Reading (mV)	Uncertainty of pH Measurement (\pm)	Coverage factor k
pH Electrode	4.008	4.01	163	0.0079	2.00
S/N.: 3234329	6.999	7.00	-12	0.0085	2.00
	9.997	10.00	-183	0.0095	2.00

Function : Temperature Measurement

(*) Without adjustment

This equipment was connected with Temperature Probe;

- Model : InLab@Expert Go-ISM
- Serial No. : 3234329

Dimension of probe

- Length : 120 mm.
- Diameter : 12 mm.
- Immersion Depth : 100 mm.

Calibration Point (°C)	Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	Uncertainty of measurement (\pm °C)	Coverage factor k
25.0	25.003	25.1	0.097	0.13	2.00
30.0	30.002	30.1	0.098	0.13	2.00
35.0	35.002	35.2	0.198	0.13	2.00

Remark - UUC* = Unit Under Calibration

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor k , providing a level of confidence of approximately 95 %.

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TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)


CORPORATE SERVICES 3 : EQUIPMENT CALIBRATION AND TESTING SERVICES

534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250

TEL. 0-2717-3000 FAX. 0-2719-9484

Certificate of Testing

Cert.No.: 24TW211
Page.: 1 of 2

Equipment : DO Meter
Manufacturer : Hanna
Model : HI98193
Serial No. : 06110066101
ID No. : ID.9
Received Date : 08 October 2024
Test Date : 09 October 2024
Reference : 2410-0258DN-1
Submitted by : Secot Co.,Ltd.
239 Rimklongprapa Road, Bangsue,
Bangkok 10800
Laboratory Condition : Temperature (25 ± 5) °C
Humidity (50 ± 20) %
Test Procedure : In - house method : CP-CH9
by Comparison Technique with Azide Modification Method
Tested by : Walalak Sirithean
Approved by : 
Approved Signatory
() Unnopphol Harachai
() Ponpan Paipim
(✓) Saithip Meangmai
Issue Date : 10 October 2024



Cert.No.: 24TW211
Page.: 2 of 2



มูลนิธิสถาบันพัฒนาอุตสาหกรรมอาหาร
ศูนย์บริการห้องปฏิบัติการอุตสาหกรรมอาหาร
Foundation for Industrial Development National Food Institute
Food Industrial Laboratory Service Center



Calibration Certificate

Condition of this result of calibration

1. Reference Standard Instruments :

This certification is traceable to the International System of Unit through the reference standards laboratory of Industrial Calibration Center, Technology Promotion Association (Thailand-Japan).

Instruments	Serial No.	ID No.	Certificate No.	Due Date
1. Burette	-	130BU10	23CG1172	22 Mar 2025
2. Balance	14233821	110RC001	24MM131	04 July 2025

2. Standard Material :-

Material	Manufacturer	Lot.No.	Assay
Sodium Thiosulfate 5-Hydrate AR	KEMAUS	2203162447	99.6%

Result : Dissolved Oxygen Meter Adjustment With Air 100 %
Dissolved Oxygen Probe No.: KC1N2993N

Titration Method (Azide Modification Method) (mg/L)	DO Meter Reading (mg/L)	Standard Deviation (mg/L)
8.16	8.16	0.0071

This report was certified only for the instrument we tested. It is allowable to use for study
Intend to use for advertising and referral purpose is prohibited. This report may not be reproduced
other in full, without written approval of the laboratory


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Certificate No.: 2403705-001-01
Client name: SECOT CO., LTD.
Address: 239 Rimklongprapa Road,
Bangsue, Bangsue, Bangkok 10800

Page 1 of 3

Equipment: CHAMBER (Incubator)
Manufacturer: MEMMERT
Model: ICP 400
Serial No.: K406.0004
ID No.: N/A
Order No.: 2403705
Operation No.: 2403705-001
Date of Receipt: 18 July 2024
Date of Calibration: 18 July 2024

Calibrated by Mr. Taveesak Seilee
Scientist

Approved by 
(Mr. Pheraphat Tuanjit)
Manager, Division of Calibration Laboratory
Responsible for the Technical Management Team

Date of Issue: 24 July 2024

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 standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the National Food Institute.

F-CS-009 Revision: 01 Date: 20-04-65

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Calibration Report

Certificate No.: 2403705-001-01
Equipment: CHAMBER (Incubator)
Model: ICP 400 Serial No.: K406.0004
Resolution: 0.1 °C ID No.: N/A
Manufacturer: MEMMERT
Date of Calibration: 18 July 2024

Page 2 of 3

Location: Laboratory, SECOT CO., LTD.
Environment Condition: Ambient Temperature (31.0 ± 1) °C
Relative Humidity (58 ± 1) %
Line Voltage (221 ± 1) Volt

Condition of this results of Calibration:

- This instrument was calibrated by insert 9 standard thermometer into its chamber and calibration according to W-TE-014 Based on TLAS G-20-1/02-08 (E): Guidelines for Calibration and Checks of Temperature Controlled Enclosures.
- The temperature scale used was based on ITS - 90.
- All data show below were final values and the initial data may be obtained upon request.
- Reference Standard Instrument :

Instrument	Model	Serial No./ID No.	Certificate No.	Due Date	Through
Digital Thermometer with sensor	34972A	MY49018263	TE 670368-01	23 March 2025	NATIONAL FOOD INSTITUTE
	RTD	CH#101-109/ RTD#101-109			

- This certificate is traceable to International System of Units (SI Units).
- This certificate was certified only for the instrument we calibrated.
- This result of calibration was found accurate as shown on date and place of calibration only.
- Condition of Calibrated item : Good

UUC Description :

Time of Record 1 Hour 9 Minute At 20.0 °C

Fresh air Damper ☐ Open Position ☐
☒ Close Fan ☐
☐ Not Available

- Result of Calibration : ☒ Without adjustment ☐ After adjustment



Calibration Report

Certificate No.: 2403705-001-01
Equipment: CHAMBER (Incubator)
Model: ICP 400 Serial No.: K406.0004
Resolution: 0.1 °C ID No.: N/A
Manufacturer: MEMMERT
Date of Calibration: 18 July 2024

Page 3 of 3

Calibration point: 20.0 °C

Calibration result:

Calibration Condition	Temperature (°C)	Relative Humidity (%)	Line Voltage (Volt)
MIN	30.0	57	220.3
MAX	32.0	59	222.1

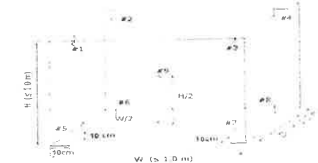


Table 1 : Reporting of Temperature

Calibration point (°C)	Measured Temperature (°C) @ Sensor No. (Sensor No.9 is REF)									Uncertainty ± (°C)
	# 1	# 2	# 3	# 4	# 5	# 6	# 7	# 8	# 9	
20.0	20.10	20.18	20.21	20.26	20.28	20.20	20.21	20.13	20.22	0.27

Table 2 : Reporting of Characterization Result

UUC* Setting (°C)	UUC* Reading (°C)			Stability ± (°C)	Uniformity (°C)	Overall Variation (°C)
	MIN	MAX	Average			
20.0	20.0	20.0	20.0	0.13	0.12	0.40

Note The quoted uncertainty include " Stability " and " Loading effect (20% of Temp Uniformity) "

UUC* = Unit Under Calibration

Stability = One-half of the greatest maximum difference of measured temperatures at any one sensors, for at least half an hour after reaching steady state.

Uniformity = The maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time.

Overall Variation = The difference of the maximum and minimum measured temperatures throughout observation time.

The report uncertainty of measurement was based on standard uncertainty multiplied by coverage factor k= 2, providing a level of confidence of approximately 95 %.

----- End -----



Calibration Certificate

Certificate No.: 2403705-002-01
Client name: SECOT CO., LTD.
Address: 239 Rimklongprapa Road,
Bangsue, Bangsue, Bangkok 10800

Page 1 of 3

Equipment: Water Bath
Manufacturer: MEMMERT
Model: WB 29
Serial No.: I698.0051
ID No.: N/A
Order No.: 2403705
Operation No.: 2403705-002
Date of Receipt: 18 July 2024
Date of Calibration: 18 July 2024

Calibrated by

Mr.Taveesak Seilee
Scientist

Approved by

(Mr.Pheraphat Tuanjit)

Manager, Division of Calibration Laboratory

Responsible for the Technical Management Team

Date of Issue: 24 July 2024

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 standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the National Food Institute.

F-CS-009 Revision: 01 Date: 20-04-65



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Calibration Report

Certificate No.: 2403705-002-01
Equipment: Water Bath
Model: WB 29 Serial No.: I698.0051
Resolution: 0.1 °C ID No.: N/A
Manufacturer: MEMMERT

Date of Calibration: 18 July 2024

Page 2 of 3

Location: Laboratory, SECOT CO., LTD.
Environment Condition: Ambient Temperature (30 ± 1) °C
Relative Humidity (58 ± 1) %
Line Voltage (221 ± 1) Volt

Condition of this results of Calibration:

- This instrument was calibrated by insert 5 standard thermometer into its liquid bath and calibration according to W-TE-011 based on ASTM E715-80 (2022): Standard Specification for Gravity-Convection and Forced-Circulation Water Baths.
 - The temperature scale used is ITS - 90.
 - All data show below were final values and the initial data may be obtained upon request.

2. Reference Standard Instrument :

Instrument	Model	Serial No./ID No.	Certificate No.	Due Date	Through
Digital Thermometer with sensor	34972A	MY49018263	TE 670368-01	23-Mar-25	NATIONAL FOOD INSTITUTE
	RTD	RTD#201-205 / CHE#201-205			

- This certificate is traceable to International System of Units (SI Units).
- This certificate was certified only for the instrument we calibrated.
- This result of calibration was found accurate as shown on date and place of calibration only.
- Condition of Calibrated item : Good
UUC Description:

Time of Record 1 Hour 9 Minute At 95.0 °C

- Result of Calibration :
☒ Without adjustment
☐ After adjustment

F-CS-012 Revision: 01 Date: 20-04-65



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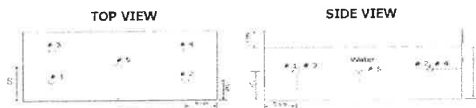
Calibration Report

Certificate No.: 2403705-002-01
Equipment: Water Bath
Model: WB 29 Serial No.: I698.0051
Resolution: 0.1 °C ID No.: N/A
Manufacturer: MEMMERT
Date of Calibration: 18 July 2024

Page 3 of 3

Calibration point: 95.0 °C
Calibration result:

Calibration Condition	Temperature (°C)	Relative Humidity (%)	Line Voltage (Volt)
Min	29.9	57	220.3
Max	31.3	59	222.1



Sensor Installation Location

Table 1 : Reporting of Temperature

Calibration Point (°C)	Measured Temperature (°C) @ Sensor No. (Sensor No.5 is REF)					Uncertainty ± (°C)
	# 1	# 2	# 3	# 4	# 5	
95.0	94.93	95.13	94.92	95.09	95.03	0.29

Table 2 : Reporting of Characterization Result

UUC* Setting (°C)	UUC* Reading (°C)			Stability ± (°C)	Uniformity (°C)	Overall Variation (°C)
	MIN	MAX	Average			
95.0	94.9	95.1	95.0	0.19	0.11	0.67

Note The quoted uncertainty include " Stability " and " Loading effect (20% of Temp Uniformity)"

UUC* = Unit Under Calibration

Stability = One-half of the greatest maximum difference of measured temperatures at any one sensors, for at least half an hour after reaching steady state.

Uniformity = The maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time.

Overall Variation = The difference of the maximum and minimum measured temperatures throughout observation time.

The report uncertainty of measurement was based on standard uncertainty multiplied by coverage factor k= 2, providing a level of confidence of approximately 95 %.

----- End -----



F-CS-012 Revision: 01 Date: 20-04-65



PinAAcle 900T Preventive Maintenance Report

Company Name: Secot.co.th

Instrument Location: Instrument room


239 Rimkhlong Prapa Road, Bang Sue, Bangkok 10800

Instrument Serial No.: PTDS23051001

Date: 01-Oct-2024

PinAAcle 900T Preventive Maintenance (PM)

Company Name:	Secot.co.th		
Address (Instrument Location):	Instrument room,239 Rimkhlong Prapa Road, Bang Sue, Bangkok 10800		
Serial Number:	PTDS23051001	PM Number:	2 OF 2 W
Customer Name (if applicable):	K.Araya	Telephone Number:	0-2959-3600
Customer Support Engineer Name:	K.Piyawit	Service Order Number:	WO-02939269
Date PM Performed: (DD-MMM-YYYY)	01-Oct-2024	Next PM Due Date: (DD-MMM-YYYY)	01-Apr-2025
Standard Labor Hours to Complete PM :		5 hours	

Part Number	Release	Publication Date	
09370143 Rev.9	A	January 2018	

Scope

The purpose of this PM is to ensure the continued functionality of the PinAAcle 900T by inspecting and replacing any worn or damaged parts. This service should only be performed by a trained representative of PerkinElmer.

The customer should save their method before the PM begins.

General Instructions:

The customer must provide the engineer operational data to demonstrate recent instrument performance prior to starting the PM. Always check with the customer before making any changes that may affect the customer's analysis or calibration, including a current back-up of system software and/or data files. The completed document should be signed by an authorized PerkinElmer and customer representative and left with the customer. Update the PM sticker and instrument logbook as required.

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Component List

Component / Specific Model	Serial #	Configuration Notes
PinAAcle900T	PTDS23051001	Syngistix V.5.1.0

Parts Lists

Parts Included with the PM		
Part Number (if applicable)	Description	Quantity
B0501696	Fan Filters	N/A
B3002013	THGA Contact Cylinders	N/A
B3141064	Glycerol for THGA Cooling	N/A
N3160156	O-Ring Kits for Sampling Introduction (Stainless Steels Nebulizer)	N/A
N3160157	O-Ring Kits for Sampling Introduction (Plastic Nebulizer)	N/A
N9301714	Replacement Acetylene Filter Cartridge	N/A
TH001022	Replacement Air Filter Cartridge	N/A

Additional Reagents and Standards Required for PM				
Part Number (if applicable)	Description	Quality	Batch/Lot #	Expired Date (MM/YY)
N9300183	1000 mg/L Copper Standard	AR	27-39CRY1	30-Apr-2025
N9300244	GFAAS Mixed Standard	AR	60-004CRY1	28-Feb-2025

Additional Reagents and Standards Required for PM (Customer Support Solution)				
Part Number (if applicable)	Description	Quantity	Batch/Lot #	Expiration Date (MM/YY)
N/A	DI Water	250 mL	AR	AR
N/A	0.5% HNO ₃	250 mL	AR	AR

Additional Tools Required for PM			
Part Number (if applicable)	Description	Quantity	Serial #
N1013000	0.2A Neutral density filter	1	MGO-672
N1013002	1.0A Neutral density filter	1	MG2-864
B3100652 Or N9307029	Electronic Flow Meter	1	MY2231FC07
B0505495	Test Jig	1	N/A
03030997	System 2 EDL Driver	1	03030997
N3050605	As System 2 EDL	1	16148
N3050121	Cu Lumina HCL	1	092216-010130
N3050109	Ba Lumina HCL	1	102416-040160
N3050139	K Lumina HCL	1	110716-010060
N3050152	Ni Lumina HCL	1	100516-030190
N3050119	Cr Lumina HCL	1	030621-020190

Procedure Checklist

Use (✓) to check off those steps in the checklist that have been completed.

1. General:

- ☒ Review the instrument performance with the customer and document any recent problems.
- ☒ Inspect the customer log book and make any appropriate PM entries.
- ☒ Perform general inspection of system for cleanliness.

2. PC Instrument Software:

- ☒ Instrument Software user files/databases archived, packed, and/or deleted as needed.

3. Mechanical:

- ☒ Inspect and clean all fans and filters. Replace filters if necessary
- ☒ Inspect all gas and water lines for leaks and/or wear. Replace if needed. Thoroughly inspect all quick connects. Replace the Y connector, P/N 09921079, if needed.
- ☒ Clean exterior of the instrument.

3.1 Flame Technique

- ☒ Inspect the burner head, burner chamber, and nebulizer. Clean if needed as stated in the Hardware Guide.
- ☒ Check burner head dimensions with the feeler gauge as stated in the Hardware Guide in the Maintenance chapter section on cleaning the burner head and checking sloth width. Replace if out of specification
- ☒ Check the condition of the end cap, burner head, and nebulizer O-rings. Replace if necessary.
- ☒ Check the drain system for signs of wear. Replace worn or damaged parts.
- ☒ Visually check for proper flame conditions when igniting the Air-C2H2 and N2O-C2H2 flames (if applicable).

3.2 THGA Technique

- ☒ Inspect the pole pieces and clean where the pole pieces contact the furnace. Replace the pole piece p-rings as needed, P/N's B0501018 & B0501250. Grease the O-rings as needed with Apiezon L grease, P/N 09905148
- ☒ Inspect the four insulation pads on the front contact housing of the THGA in furnace. If the pads are missing replace the THGA furnace or replace the insulator pads on the furnace.
- ☒ Inspect the graphite tube and clean the contact cylinders. Replace if necessary.
- ☒ Check internal and external gas flows with the Electronic Gas Flow Meter and the Gas Flow Test Probe as described in the Service Manual. Correct if necessary.
- ☒ Check furnace open/close function.
- ☒ Verify the operation of the GFTV Camera for proper operation and viewing alignment in the furnace camera Tube View window. Align if needed.
- ☒ Check the operation of the Halogen Light ASSY for the GFTV Camera. Replace if needed.
- ☒ Check the water level/quality in the recirculation (if applicable). Add distilled water if necessary.
- ☒ Check the cooling system fluid flow rate with the FCS In-Line Flow Meter for proper levels if needed. Refer to SDB# COSY008.STN

- ☒ Perform Cooling System maintenance if needed per SDB# COSY005.STN.
- ☒ Check auto sampler operation.
- ☒ Perform an auto sampler check valve test as described in the Service Manual.
- ☒ Lubricate the spindles of the auto sampler pumps and all moving parts of the tray mechanics as described in the Service Manual.
- ☒ Inspect the auto sampler sampling capillary as described in the Service Manual. Replace if necessary.

4. Electrical:

- ☒ Inspect PC boards. Clean if necessary.
- ☒ Carefully check all internal and external cable connections.
- ☒ Check instrument firmware revisions upgrade to current levels (if necessary)
- ☒ Run Diagnostics Test within the Advanced function of the Spectrometer page. Check the results in the service log folder in the Spectrometer BM Log Viewer.

5. Optics:

- ☒ Inspect and clean the sample compartment windows, if needed.
- ☒ Inspect and clean the furnace windows, if needed.
- ☒ Inspect and clean the GFTV camera lens, if needed.
- ☒ Inspect optics. Clean or replace if necessary,

6. Gasses:

- ☐ Verify that the Gasses supplied to the instrument are within the pressure and purity specifications found in the PinAAcle 900 Series Pre-installation Checklist SDB.
- ☒ Verify that the air filter element is dry. Replace if necessary.

7. Flame Interlock Check:

Description: Check to ensure that all safety interlocks are closed.

Parameter	Specification	Test Results	Pass/Fail
Flame Sensor	Air/C ₂ H ₂ Flame correctly shuts down	Active	Passed
Drain Sensor	Air/C ₂ H ₂ Flame correctly shuts down	Active	Passed
Nebulizer Sensor	Air/C ₂ H ₂ Flame correctly shuts down	Active	Passed
C ₂ H ₂ Pressure Sensor	Air/C ₂ H ₂ Flame correctly shuts down	Active	Passed
Air Pressure Sensor	Air/C ₂ H ₂ Flame correctly shuts down	Active	Passed
Burner Head Sensor	Choosing Nitrous Oxide as the oxidant should trigger an interlock shuts down	Active	Passed

8. After PM Performance tests [Flame]:

8.1 Detector Linearity with Barium

Description: Ensures that the detector is linear in the Visible Range.

Parameter	Specification	Certificate Value at 553.6 nm (Abs.)	Test Results	Pass/Fail
1.0 A ND Filter	± 5% from Cert.	1.0154	0.9910	Passed
0.2 A ND Filter	± 5% from Cert.	0.1806	0.1955	Passed

8.2 Baseline Noise at 1.0 Absorbance with Barium

Description: Ensures that a high absorbance will not produce excessive noise.

Parameter	Specification	Results	Pass/Fail
Standard Deviation	≤ 0.010	0.0022	Passed

8.3 AA Baseline Noise with Copper

Description: Check baseline noise.

Parameter	Specification	Results	Pass/Fail
Standard Deviation	≤ 0.001	0.0005	Passed

8.4 D₂ Background Compensation with Copper

Description: Verifies the instruments ability to compensate for Background absorption.

Parameter	Specification	Results	Pass/Fail
Standard Deviation	≤ 0.010	0.0005	Passed

8.5 AA-BG Baseline Noise with Copper

Description: Ensures that background correction does not produce excessive noise.

Parameter	Specification	Results	Pass/Fail
Standard Deviation	≤ 0.005	0.0001	Passed

8.6 AA-BG Baseline Noise with Arsenic

Description: Ensures that background correction does not produce excessive noise at a low wavelength.

Parameter	Specification	Results	Pass/Fail
Standard Deviation	≤ 0.005	0.0005	Passed

8.7 Flame Sensitivity

Description: Instrument Sensitivity checked against Copper standard.

Standard Copper Sensitivity	Specification	Results (Abs.)	Pass/Fail
5 mg/L Sensitivity SS Neb (if applicable)	> 0.250 Abs.	N/A	Not Applicable
2 mg/L Sensitivity HS Neb (if applicable)	> 0.250 Abs.	0.3155	Passed

9. After PM Performance tests [THGA]:

9.1 Furnace Gas Flows

Description: Ensures the flow rates are within specification.

Parameter	Specification	Test Results	Pass/Fail
Internal Flow Rate	250 mL/min \pm 25 mL/min	250	Passed
External Flow Rate	100 mL/min \pm 10 mL/min	99	Passed

9.2 Chromium Baseline Noise

Description: Signal to noise check.

Parameter	Specification	Results	Pass/Fail
Baseline Noise	≤ 0.005 Abs.	0.0003	Passed
Standard Deviation	≤ 0.005	0.0001	Passed

9.3 Chromium Characteristic Mass and Precision

Description: Calculate the characteristic mass using the characteristic mass tool and precision from the integrated absorbance values.

Parameter	Specification	Results	Pass/Fail
Cr m_0 Results	≤ 7.0 pg/0.0044 A-s	4.60	Passed
Precision	≤ 2.0 %	1.30	Passed

9.4 Copper Characteristic Mass and Zeeman Ratio

Description: Calculate the characteristic mass using the characteristic mass tool and check the Zeeman Ratio.

Parameter	Specification	Results	Pass/Fail
Cu m_0 Result	≤ 16.5 pg/0.0044 A-s	14.30	Passed
Zeeman Ratio	0.52 ± 0.04	0.5417	Passed

10. Review:

- ☒ Review with the customer PM work performed.
- ☒ Review with the customer routine maintenance procedures.
- ☒ Discuss recommended customer supplied materials to have on hand.
- ☒ Attach PM sticker.

Additional Comments

Additional Comments Regarding the PM	
Zeeman Ratio	$= \frac{\text{Atomic Signal (Peak area)}}{\text{Atomic Signal (Peak area)} + \text{Background Signal (Peak area)}}$
	$= \frac{0.1610}{0.1610 + 0.1362}$
	$= 0.5417$

Review

<p><i>The preventive maintenance checks and if applicable performance tests for PinAAcle 900T have been completed.</i></p> <p><i>This PinAAcle 900T Passes <input checked="" type="checkbox"/> Fails <input type="checkbox"/> the preventive maintenance.</i></p>	
<p>Review of Preventive Maintenance:</p>	
<p>Authorized PerkinElmer Representative:</p> <p><i>Piyawit S.</i></p>	<p>Date:</p> <p>01-Oct-2024</p> <p>(DD-MMM-YYYY)</p>
<p>Authorized Customer Representative:</p>	<p>Date:</p> <p>01-Oct-2024</p> <p>(DD-MMM-YYYY)</p>

Agilent CrossLab Start Up Services

Agilent 5100 5110 ICP-OES Preventive Maintenance

Agilent Preventive Maintenance provides factory recommended service for your analytical instruments to assure reliable operation and the accuracy of your results

Delivered by highly trained and certified service engineers using genuine Agilent parts and supplies, Agilent Preventive Maintenance provides what you need to reduce unplanned downtime and keep your systems operating at their peak performance.

This checklist is used as a guide for completing the preventive maintenance tasks. A signed copy of this checklist is provided for your records.

Introduction

Customer Information

- Customers should provide all necessary operating supplies upon request of the engineer.
- A customer representative should be available to the engineer while performing the preventive maintenance procedures. Customers are responsible for regular maintenance and are encouraged to observe the service representative.
- Any parts not included in the Parts Lists section of this document are not part of the recommended Preventive Maintenance service nor are they included in the price of this service.
- If a system requires the use of extra or special procedures and/or parts for the maintenance service, then these must be ordered separately and charged as a repair, which may incur additional costs.
- For customers using HF applications, the instrument should be returned to its standard sample introduction system.

Important Customer Web Links

- To access **Agilent University**, visit <http://www.agilent.com/crosslab/university/> to learn about training options, which include online, classroom and onsite delivery. A training specialist can work directly with you to help determine your best options.
- To access the **Agilent Resource Center** web page, visit <https://www.agilent.com/en-us/agilentresources>. The following information topics are available:
 - Sample Prep and Containment
 - Chemical Standards
 - Analysis
 - Service and Support
 - Application Workflows
- The **Agilent Community** is an excellent place to get answers, collaborate with others about applications and Agilent products, and find in-depth documents and videos relevant to Agilent technologies. Visit <https://community.agilent.com/welcome>
- Videos about specific preparation requirements for your instrument can be found by searching the **Agilent YouTube** channel at <https://www.youtube.com/user/agilent>
- **Need to place a service call?** Flexible Repair Options | Agilent



Service Engineer's Responsibilities

- Contact the customer and ensure that all necessary supplies are available before the preventive maintenance visit.
- Only select those pages that relate to the system or module being serviced.
- Complete empty fields with the relevant information.
- Complete the relevant checkboxes in the checklist using either a "X" or tick mark "✓".
- Check "Service not applicable" check boxes to indicate services/tasks not delivered, as appropriate.
- Complete the Preventive Maintenance services in the most logical order relevant to the individual system service in the order of the tasks listed.
- Complete the Service Review section together with the customer.
- Complete the fields for page numbers at the foot of each selected page
- Add relevant page numbers to selected pages and complete the total number of pages field in the Service Completion section
- Ask the customer to sign the Service Verification section including the customer's and your signature.



Instrument Maintenance

System Information

☐ Check this box if an instrument configuration report is attached instead of completing the table.

Instrument System Name and ID	G8019A / MY16290003
Instrument System Site and Location	SECOT CO LTD

List System Component Product Numbers	List the Serial Numbers of each Component
1. G8019A	MY16290003
2. G8481A	3B1641349
3.	
4.	
5.	
6.	
7.	
8.	
9.	

ICP-OES Configuration Table	Circle the type or write in the type if other
Nebulizer Type	SeaSpray OneNeb Conikal Other
Spray Chamber	Cyclonic Single Pass Cyclonic Double Pass Other
Torch	Radial Dual View Other
Torch Type	One Piece Semi Demountable Fully Demountable Other
Injector Diameter	2.4mm 1.8mm 1.4mm 0.8mm Other
Injector Material	Quartz Ceramic Other



Preparation

- ☒ Discuss any specific issues with the customer before starting.
- ☒ Review the instrument logbook for recorded problems and comments.
- ☒ Save instrument control settings before starting the procedure.
- ☒ Perform a general inspection of the system for cleanliness.
- ☒ Check for proper installation of parts, assemblies, sensors etc.
- ☒ Check system for required installation of components and implementation of Service Notes
- ☐ Check for required firmware/software updates and verify with customers if they would like them installed.
- ☐ For HF application systems, if standard sample introduction system was not installed, ask the customer to install it.
- ☒ Ask the customer to remove any samples from the ICP-OES sample introduction area, auto sampler or around the ICP-OES.

Preventive Maintenance Procedures

Record Pre-PM instrument performance

- ☒ Run Instrument Performance test.
- ☒ Record results in Instrument Performance Test Results Table – Pre-PM.

Clean and inspect ICP-OES system

- ☒ Look for any obvious external damage or problems.
- ☒ Inspect water cooling hoses, gas lines and power cord for excessive wear or damage.
- ☒ Perform a general internal inspection of the system for excessive dust accumulation, clean if necessary.
- ☒ Inspect sample introduction components and record any required maintenance in the Service Engineer Comments and notify the customer as the required actions required.
- ☒ Record the instrument operating conditions in the ICP-OES Status Results Table.
- ☒ Replace the polychromator purge filter.
- ☒ Replace the radial pre-optics window
- ☒ Replace the axial pre-optics window for SVDV and VDV instruments.
- ☒ Check exhaust flow for the correct positive extraction at the exhaust duct to insure they meet minimum specifications.
- ☒ Replace air inlet dust filter:
- ☒ Replace high capacity air inlet dust filter element if installed.
- ☒ Remove and clean instrument water inlet filter.

Agilent Water Recirculator

- ☐ **Service not applicable**
- ☒ Drain cooling fluid and remove any particles from the chiller reservoir
- ☒ Remove, clean and reinstall water inlet metal mesh filter if present.
- ☒ Re fill with Agilent Cool Clear cooling fluid.
- ☒ Clean the cooling system Air filter and the condenser.

SPS 3 Auto Sampler

☒ Service not applicable

- ☐ Power cycle the autosampler and verify successful initialization.
- ☐ Inspect X and Z axis belts for wear. Replace is necessary.
- ☐ Clean X and Z axis slide shafts.
- ☐ Using customer's racks and the Agilent software move the sample probe to the 4 outermost corners and rinse port, ensure that the probe is approximately centered in the vial.

SPS 4 Auto sampler

☒ Service not applicable

- ☐ Clean the spill tray, rack location mat, end frames and chassis with a damp soft cloth and diluted mild detergent.
- ☐ Clean the auto sampler cover panels, if cover kit is installed, with domestic window cleaner.
- ☐ Check the X-axis and Z-axis drive belts for cracks, splits, damaged teeth, excessive fraying, color changes or degradation from fumes.
- ☐ Check the X-axis, Theta-axis and Z-axis FFC cables for cracks, incorrect positioning, damaged edges or damaged connectors.
- ☐ Pump Tubing Replacement. Replace peristaltic pump tubing. Replace all tubing that goes from the rinse station to the pump and from the pump to the waste/rinse bottles
- ☐ Test using customer's tray and move the sample probe to the sample vial 1, wash vial and rinse port and ensure that the probe is centered in the vial. If not use calibration wizard and calibrate the position.

AVS 4, 6, 7 Advanced Valve System

☒ Service not applicable

- ☐ Replace valve rotor seal
- ☐ Check fittings for signs of leaks
- ☐ Check tubing including autosampler tubing for kinks or excessive wear
- ☐ Check high flow pump for signs of leaks

ADS 2 Advanced Dilution System (5110 only)

- ☒ SERVICE NOT APPLICABLE
- ☐ LOOK FOR ANY OBVIOUS EXTERNAL DAMAGE OR PROBLEMS.
- ☐ REPLACE VALVE ROTOR SEAL ON VALVES A AND B.
- ☐ REPLACE BOTH SYRINGES.
- ☐ REPLACE ACID VAPOR FILTER (WASTE VESSEL)
- ☐ REPLACE VENTING VALVE (DILUENT CARRIER BOTTLE)
- ☐ CHECK FITTINGS FOR SIGNS OF LEAKS.
- ☐ CHECK TUBING INCLUDING AUTOSAMPLER TUBING FOR KINKS OR EXCESSIVE WEAR.

ICP-OES adjustment

- ☒ Check position of Zn peak, adjust if required.
- ☒ Check Argon Ratio, adjust to specified value if required.
- ☒ Perform Detector Calibration.
- ☒ Perform Instrument Calibration.

Record Post-PM instrument performance

- ☒ Run Instrument Performance test.
- ☒ Record results in Instrument Performance Test Results Table - Post PM.
- ☒ For systems using ICP Expert version 7.3 and above, run the following Instrument tests

- ☒ Subsystem Communications Test
- ☒ Air Flow
- ☒ Water Flow
- ☒ Gas Flows
- ☒ RF Generator
- ☒ Camera Test
- ☒ Optics Test
- ☒ Nebulizer Test

- ☒ Record the result in the Instrument Test Results Table



Restore Instrument

- ☐ For HF applications, ask the customer to reinstall their sample introduction system.
- ☐ Leave system in an idle state: on and purging.
- ☐ Guidance: If the PM service is performed prior to a qualification service, then use the qualification procedure as a guide for final instrument set up and checkout.

Service Review

- ☒ Attach available reports/printouts of all tests to this documentation.
- ☒ Record the Preventive Maintenance service activity in the customer's records/logbook.
- ☒ Record the PM event in the Smart Alerts logbook, if applicable.
- ☒ Update/reset instrument maintenance counters as appropriate.
- ☒ Affix the PM sticker to the system or instrument logbook based on the customer's request.
- ☒ Complete the Service Engineer Comments section if there are additional comments.
- ☒ Review this service, parts replaced, and test results obtained with the customer.
- ☐ If the instrument firmware was updated, record the details of the change in the Service Engineer's Comments box. Systems in a compliant environment may need additional documentation.
- ☒ Complete the Signature Page with both Service Engineer and Customer signatures.



Test Results

Instrument Performance Test Results Table

Note: These measurements do not form part of any specification and are for reference only.

	Pre PM Sensitivity Check		Post PM Sensitivity Check	
	Radial	Axial *	Radial	Axial*
Zn 213.857 nm SRBR	44981.4	219168.3	46565.2	228606.8
Mn 257.610 nm SRBR	149305.7	1201937.7	144201.8	1310696.6
Al 396.152 nm SBR	29292.3	211651.3	31022.6	274589.4
K 766.491 nm SBR	59246.0	1487886.3	61673.7	1951192.1

* Axial result is not applicable for G8016AA, G8012AA Radial View instruments.

Instrument Test Results Table

Note: The Instrument Test results are for systems using ICP Expert version 7.3 and above only.

Instrument Test	Result
Subsystem Communications Test	Pass
Air Flow	Pass
Water Flow	Pass
Gas Flows	Pass
RF Generator	Pass
Camera Test	Pass
Optics Test	Pass
Nebulizer test	Pass



ICP-OES Status Results Table

Note: These measurements do not form part of any specification and are for reference only.

Measurement	Standby Mode	Plasma On
Mains Voltage	219.182 VAC	219.296 VAC
Mains Current	0.263 A	0.299 A
Instrument Temperature	22.8 °C	24.8 °C
RF Air Flow (sensor speed)	8.0 Hz	18.0 Hz
Plasma Exhaust Temperature	No measurement	38.8 °C
Water Flow Oscillator	No measurement	1.42 L/min
Water Flow Detector	0.0 L/min	1.11 L/min
Water Inlet Temperature	28.2 °C	16.6 °C
Polychromator Temperature	30.3 °C	39.0 °C
CCD Temperature	39.1 °C	-39.7 °C
Thermal Stabilizer	29.6 °C	32.1 °C
Argon Supply Pressure	635.26 kPa	588.21 kPa
Purge Gas Supply Pressure*1	634.49 kPa	624.41 kPa
Option Gas Supply Pressure*1	- kPa	- kPa
Nebulizer Flow	No measurement	0.90 L/min
Nebulizer Back Pressure	No measurement	311.00 kPa
Plasma Gas Flow	No measurement	11.90 L/min
Auxiliary Gas Flow	No measurement	1.00 L/min
RF Power	No measurement	1198.4 W
RF Supply Current	No measurement	8.209 A
RF Supply Voltage	No measurement	194.497 V

*1 If option installed

Consumed PM Parts

Part Description	Part Number	Product or Model# where used	Quantity consumed
Axial Pre-Optic Window	G8010-68014	G8010A, G8011A, G8014A/G8015A	1
Radial Pre-Optic Window	G8010-68015	All	1
Agilent Cool Clear Coolant Fluid	5799-0037	Agilent Water Recirculator	N/A
Purge Gas Filter	G8010-60136	All	1
Air inlet filter	G8000-68002	All	1
High Capacity Air Filter	G8010-60189	Optional	
Rotor seal for 6-7 port valve for AVS6/7	G8494-60002	G8494A/G8495, ADS 2	N/A
Rotor seal for 4 port valve for AVS4	G8493-60002	G8493A	N/A
Rinse solution to rinse station 2.5mm id x 1m	G8410-80123	SPS 4	N/A
Barb connector 2.5mm-1.5mm ID	G8410-80124	SPS 4	N/A
PVC waste tubing, 8mm od x 5mm id, 2m	G8410-80122	SPS 4	N/A
Syringe, 5mL	5299-0037	ADS 2	N/A
Syringe, 10mL	5299-0038	ADS 2	N/A
Acid vapor filter	5043-1193	ADS 2	N/A
Venting valve	5043-1190	ADS 2	N/A
Additional Parts may be required from engineer's stock:			
X axis drive belt	5410047500	SPS 3	N/A
Z axis drive belt	5410047400	SPS 3	N/A
Peristaltic pump tubing, PVC SolvaFlex, 3 bridged,	3710049000	SPS 4	N/A

Consumed Parts Reference
(Purchased by customer, not included as part of PM)

☐ Section Not Applicable.

Part Description	Part Number	Product or Model# where used	Quantity consumed
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Part Description	Part Number	Product or Model# where used	Quantity consumed
------------------	-------------	---------------------------------	----------------------

Signature Page

Service Engineer Comments (optional)

If there are any specific points you wish to note as part of performing the installation or other items of interest for the customer, please write in this box.

Service Verification

Service Request Number:

6007091996

Date Service Completed:

01 Aug 2024

Service Engineer Name:

Sunen Onkhom

Customer Name:



Service Engineer Signature:

Sunen O.

Customer Signature:



Total number of pages in this document:

19 page



CERTIFICATE OF ANALYSIS

Agilent Product Name: Wavelength Calibration Solution for ICP-OES & MP AES, 5 mg/L, 500mL

Agilent Part No: 6610030100

Lot No: 0013747621

Product Specifications

Analyte	Starting Material	CAS #	Certified Conc.	Analyte	Starting Material	CAS #	Certified Conc.
Al	Al(NO ₃) ₃	7784-27-2	4.930 ± 0.025 mg/L	Mn	Mn	7439-96-6	4.930 ± 0.025 mg/L
As	As	7440-38-2	4.930 ± 0.025 mg/L	Mo	(NH ₄) ₂ MoO ₄	13106-70-8	4.930 ± 0.025 mg/L
Ba	Ba(NO ₃) ₂	10022-31-8	4.930 ± 0.025 mg/L	Ni	Ni	7440-02-0	4.930 ± 0.025 mg/L
Cd	Cd	7440-43-9	4.930 ± 0.025 mg/L	Pb	Pb	7439-92-1	4.930 ± 0.025 mg/L
Co	Co	7440-48-4	4.930 ± 0.025 mg/L	Se	Se	7782-49-2	4.930 ± 0.025 mg/L
Cr	Cr(NO ₃) ₃	15548-36-4	4.930 ± 0.025 mg/L	Sr	Sr(NO ₃) ₂	10042-76-9	4.930 ± 0.025 mg/L
Cu	Cu	7440-50-8	4.930 ± 0.025 mg/L	Zn	Zn	7440-66-6	4.930 ± 0.025 mg/L
K	KNO ₃	7757-79-1	49.30 ± 0.25 mg/L				

Matrix: 5% HNO₃

Intended Use: This solution is intended for use as a certified reference material or calibration standard for inductively coupled plasma optical emission spectroscopy (ICP-OES), inductively coupled plasma mass spectrometry (ICP-MS), atomic absorption spectroscopy (flame AAS or GFAAS), microwave plasma atomic emission spectroscopy (MP-AES), x-ray fluorescence spectroscopy (XRF), and other techniques for elemental analysis.

Certification & Traceability: This CRM was manufactured under a quality management system that is registered to ISO 9001, ISO 17034 and ISO/IEC 17025. This CRM was prepared to the certified concentrations shown above by gravimetric methods using single element concentrates that were certified using the "High Performance ICP-OES" protocol developed by NIST and are directly traceable to the NIST SRMs listed below. This solution was stabilized using high purity nitric acid (HNO₃) and diluted with filtered (0.22µm), 18 M-ohm deionized water. The balances used in the preparation of this CRM are calibrated regularly with traceability to NIST. All volumetric dilutions are performed in Class A calibrated glassware. The certified concentrations were determined based upon gravimetric procedures. Secondary verification of the certified concentrations was performed using ICP-OES that was calibrated and/or referenced against NIST SRMs: 3101a, 3103a, 3104a, 3108, 3113, 3112a, 3114, 3141a, 3132, 3134, 3136, 3128, 3149, 3153a, and 3168a. The uncertainty associated with each certified concentration represents the expanded uncertainty at the 95% confidence level using a coverage factor of k=2.

Instructions for Use: Agilent recommends that the solution be thoroughly mixed by repeated shaking or swirling of the bottle immediately prior to use. To achieve the highest accuracy the analyst should: (1) use only pre-cleaned containers and transferware, (2) avoid pipetting directly from the CRM's original container, (3) use a minimum sub-sample size of 500µL, (4) make dilutions using calibrated balances or certified volumetric class A flasks and pipettes, (5) dilute to volume using the same matrix as the original CRM, and (6) never pour used product back into the original container. The solution should be kept tightly capped and stored under normal laboratory conditions. Do not freeze, heat, or expose to direct sunlight. Minimize exposure to moisture or high humidity.



Period of Validity: Agilent ensures the accuracy of this solution until the expiration date shown below, provided the instructions for use are followed. During the period of validity, the purchaser will be notified if this product is recalled due to any significant changes in the stability of the solution.

Sample lot approval:

Chuck Gaudreau
Chuck Gaudreau, Certifying Officer

Date of release: 2 August 2023

Date of expiration: 28 February 2025

Simon O.
01 Aug 24

Simon O.
01 Aug 24

Resolution Test			Pass
Element Wavelength	Specification	Width	
N (174.213 nm)	≤ 9.40	6.96	
As (188.980 nm)	≤ 8.20	6.41	
C (193.027 nm)	≤ 11.50	9.02	
Mo (202.032 nm)	≤ 8.20	6.60	
Cr (206.158 nm)	≤ 13.40	9.74	
Zn (213.857 nm)	≤ 8.70	6.65	
Pb (220.353 nm)	≤ 9.50	6.77	
Co (228.615 nm)	≤ 17.20	13.09	
Ba (230.424 nm)	≤ 9.40	7.53	
Mn (257.610 nm)	≤ 13.30	10.49	
Mn (260.568 nm)	≤ 20.30	15.78	
Cr (267.716 nm)	≤ 11.00	8.55	
Cu (324.754 nm)	≤ 25.00	20.67	
Cu (327.395 nm)	≤ 14.20	11.37	
Sr (338.071 nm)	≤ 33.50	26.39	
Ba (455.403 nm)	≤ 44.00	35.57	
Sr (460.733 nm)	≤ 36.00	21.36	
Ba (493.408 nm)	≤ 36.00	24.06	
Ba (614.171 nm)	≤ 42.00	24.54	
Ar (675.283 nm)	≤ 74.00	53.58	
K (766.491 nm)	≤ 80.00	57.73	

Simon O.
01 Aug 24

Sensitivity Test						Pass
Radial						
Element Wavelength	Specification	Method	Ratio	Standard	Blank	
As (188.980 nm)	≥ 46.0	SRBR	154.5	1413.4	75.0	
Se (196.026 nm)	≥ 41.0	SRBR	80.2	816.3	83.5	
Zn (213.857 nm)	≥ 1421.0	SRBR	3488.6	44981.4	165.0	
Pb (220.353 nm)	≥ 46.0	SRBR	172.0	2486.9	180.0	
Mn (257.610 nm)	≥ 3518.0	SRBR	8373.9	179305.7	456.2	
Al (396.152 nm)	≥ 3.4	SBR	7.0	29292.3	3654.5	
Ba (493.408 nm)	≥ 34.0	SBR	108.2	1096622.7	10041.7	
K (766.491 nm)	≥ 1.8	SBR	2.6	59246.0	16569.2	
Axial						
Element Wavelength	Specification	Method	Ratio	Standard	Blank	
As (188.980 nm)	≥ 208.0	SRBR	379.7	6009.9	231.6	
Se (196.026 nm)	≥ 159.0	SRBR	226.4	3947.1	264.6	
Zn (206.200 nm)	≥ 234.0	SRBR	1195.4	14358.1	141.4	
Zn (213.857 nm)	≥ 1743.0	SRBR	8803.2	219168.3	616.4	
Cd (214.439 nm)	≥ 4227.0	SRBR	7423.0	139750.0	352.7	
Pb (220.353 nm)	≥ 320.0	SRBR	653.9	17645.2	673.7	
Mn (257.610 nm)	≥ 10625.0	SRBR	29180.0	1201937.7	1691.9	
Cr (267.716 nm)	≥ 1048.0	SRBR	5464.9	247814.5	2022.9	
Cu (324.754 nm)	≥ 19.0	SBR	45.4	227484.3	4901.6	
Al (396.152 nm)	≥ 6.0	SBR	17.9	211651.3	11221.7	
Ba (493.408 nm)	≥ 60.0	SBR	229.6	6957089.5	30175.5	
K (766.491 nm)	≥ 24.0	SBR	43.1	1787886.3	40587.6	

Simon O.
01 Aug 24

Precision Test

Pass

Radial

Element Wavelength	Specification	Measured Value % RSD
As (188.980 nm)	≤ 2.60	0.80
Se (196.026 nm)	≤ 2.60	0.93
Zn (213.857 nm)	≤ 1.50	0.33
Pb (220.353 nm)	≤ 2.60	0.50
Mn (257.610 nm)	≤ 1.50	0.26
Al (396.152 nm)	≤ 1.50	0.23
Ba (493.408 nm)	≤ 1.50	0.63
K (766.491 nm)	≤ 1.50	0.15

Axial

Element Wavelength	Specification	Measured Value % RSD
As (188.980 nm)	≤ 1.50	0.54
Se (196.026 nm)	≤ 1.50	0.36
Zn (206.200 nm)	≤ 1.50	0.42
Zn (213.857 nm)	≤ 1.50	0.30
Cd (214.439 nm)	≤ 1.50	0.43
Pb (220.353 nm)	≤ 1.50	0.30
Mn (257.610 nm)	≤ 1.50	0.76
Cr (267.716 nm)	≤ 1.50	0.21
Cu (324.754 nm)	≤ 1.50	0.45
Al (396.152 nm)	≤ 1.50	0.25
Ba (493.408 nm)	≤ 1.50	1.15
K (766.491 nm)	≤ 1.50	0.53

Simon O.
01 Aug 24

Report Summary

Instrument Model	Agilent 5100/5110 VDV ICP-OES
Instrument ID	G8011A/G8015A
Instrument Serial Number	MY16230003
Software Version	7.3.0.8799
Firmware Version	3354
Tested By	suwan onkhom
Test Completed On	8/1/2024 11:13:23 AM

Result Summary

Subsystem Communications Test	Skipped
Air Flow Test	Skipped
Water Flow Test	Skipped
Gas Flows Test	Skipped
RF Generator Test	Skipped
Camera Test	Skipped
Optics Test	Skipped
Advanced Valve System Test	Skipped
Resolution Test	Pass
Sensitivity Test	Pass
Precision Test	Pass

Simon O.
01 Aug 24

Resolution Test			Pass
Element Wavelength	Specification	Width	
N (174.213 nm)	≤ 9.40	6.90	
As (188.980 nm)	≤ 8.20	6.33	
C (193.027 nm)	≤ 11.50	8.79	
Mo (202.032 nm)	≤ 8.20	6.35	
Cr (206.158 nm)	≤ 13.40	9.66	
Zn (213.857 nm)	≤ 8.70	6.93	
Pb (220.353 nm)	≤ 9.50	6.87	
Co (228.615 nm)	≤ 17.20	12.81	
Ba (230.424 nm)	≤ 9.40	7.18	
Mn (257.610 nm)	≤ 13.30	10.36	
Mn (260.568 nm)	≤ 20.30	15.88	
Cr (267.716 nm)	≤ 11.00	8.26	
Cu (324.754 nm)	≤ 25.00	20.66	
Cu (327.395 nm)	≤ 14.20	11.11	
Sr (338.071 nm)	≤ 33.50	26.73	
Ba (455.403 nm)	≤ 44.00	35.67	
Sr (460.733 nm)	≤ 36.00	19.01	
Ba (493.408 nm)	≤ 36.00	25.15	
Ba (614.171 nm)	≤ 42.00	24.12	
Ar (675.283 nm)	≤ 74.00	54.77	
K (766.491 nm)	≤ 80.00	58.36	

Simon O.
01 Aug 24

Sensitivity Test						Pass
Radial						
Element Wavelength	Specification	Method	Ratio	Standard	Blank	
As (188.980 nm)	≥ 46.0	SRBR	149.8	1385.5	76.4	
Se (196.026 nm)	≥ 41.0	SRBR	79.7	834.5	87.8	
Zn (213.857 nm)	≥ 1421.0	SRBR	3602.1	46565.2	165.9	
Pb (220.353 nm)	≥ 46.0	SRBR	174.6	2530.0	181.0	
Mn (257.610 nm)	≥ 3518.0	SRBR	9000.1	194201.8	463.4	
Al (396.152 nm)	≥ 3.4	SBR	7.2	31022.6	3798.3	
Ba (493.408 nm)	≥ 34.0	SBR	105.3	1073096.3	10095.7	
K (766.491 nm)	≥ 1.8	SBR	2.7	61673.7	16888.8	
Axial						
Element Wavelength	Specification	Method	Ratio	Standard	Blank	
As (188.980 nm)	≥ 208.0	SRBR	378.2	5964.0	229.9	
Se (196.026 nm)	≥ 159.0	SRBR	234.4	4108.6	268.4	
Zn (206.200 nm)	≥ 234.0	SRBR	1141.8	13683.2	140.7	
Zn (213.857 nm)	≥ 1743.0	SRBR	9264.5	228606.8	605.7	
Cd (214.439 nm)	≥ 4227.0	SRBR	7735.4	144378.7	346.7	
Pb (220.353 nm)	≥ 320.0	SRBR	682.6	18182.4	659.0	
Mn (257.610 nm)	≥ 10625.0	SRBR	31468.8	1310696.6	1730.2	
Cr (267.716 nm)	≥ 1048.0	SRBR	5812.5	262608.6	2010.1	
Cu (324.754 nm)	≥ 19.0	SBR	45.5	241749.8	5197.4	
Al (396.152 nm)	≥ 6.0	SBR	18.5	224589.4	11530.6	
Ba (493.408 nm)	≥ 60.0	SBR	228.4	6882412.4	30007.1	
K (766.491 nm)	≥ 24.0	SBR	46.0	1951197.1	41478.8	

Simon O.
01 Aug 24

Precision Test			Pass
Radial			
Element Wavelength	Specification	Measured Value % RSD	
As (188.980 nm)	≤ 2.60	1.04	
Se (196.026 nm)	≤ 2.60	0.80	
Zn (213.857 nm)	≤ 1.50	0.30	
Pb (220.353 nm)	≤ 2.60	0.44	
Mn (257.610 nm)	≤ 1.50	0.43	
Al (396.152 nm)	≤ 1.50	0.35	
Ba (493.408 nm)	≤ 1.50	0.61	
K (766.491 nm)	≤ 1.50	0.19	
Axial			
Element Wavelength	Specification	Measured Value % RSD	
As (188.980 nm)	≤ 1.50	0.66	
Se (196.026 nm)	≤ 1.50	0.57	
Zn (206.200 nm)	≤ 1.50	0.41	
Zn (213.857 nm)	≤ 1.50	0.39	
Cd (214.439 nm)	≤ 1.50	0.46	
Pb (220.353 nm)	≤ 1.50	0.34	
Mn (257.610 nm)	≤ 1.50	0.77	
Cr (267.716 nm)	≤ 1.50	0.28	
Cu (324.754 nm)	≤ 1.50	0.35	
Al (396.152 nm)	≤ 1.50	0.28	
Ba (493.408 nm)	≤ 1.50	0.64	
K (766.491 nm)	≤ 1.50	0.67	

Simon O.
01 Aug 24

Report Summary		
Instrument Model	Agilent 5100/5110 VDV ICP-OES	
Instrument ID	G8011A/G8015A	
Instrument Serial Number	MY16230003	
Software Version	7.3.0.8799	
Firmware Version	3354	
Tested By	suwan onkhom	
Test Completed On	8/1/2024 11:28:36 AM	
Result Summary		
Subsystem Communications Test	Pass	
Air Flow Test	Pass	
Water Flow Test	Pass	
Gas Flows Test	Pass	
RF Generator Test	Pass	
Camera Test	Pass	
Optics Test	Pass	
Advanced Valve System Test	Skipped	
Resolution Test	Skipped	
Sensitivity Test	Skipped	
Precision Test	Skipped	
Subsystem Communications Test		
Pass		
Air Flow Test		
Pass		
30% Air Flow (relative speed)	75% Air Flow (relative speed)	
12.00	18.00	
Water Flow Test		
Pass		
RF Water Flow(L/min)	Camera Water Flow (L/min)	Water Inlet Temperature (°C)
1.40	1.12	21.28

Suwan O.
Aug 24

Simon O.
01 Aug 24



Certificate of Completion

Learner Name:

Suwan Onkhom

Title Of Course:

ANV-CE-ICPOES-2-024-A: Agilent 5100 5110 ICP-OES Support Add On Training

Completion Date:

26 2567

Certified By Company:

Learning at Agilent

All Service and Support training certificates have the following specific limitations.

A certificate for Service and Support training is only valid while employed by Agilent Technologies or while working as an Agilent-authorized service provider; through which the service employee has ongoing access to Agilent's Safety Alerts, Service Notes, internal technical updates, update training, current documentation, technical support, current parts, and parts updates. Completion of training alone, without being employed by Agilent Technologies, does not qualify an individual to safely install, service or maintain Agilent products.

Gas Flows Test			Pass		
Nebulizer Target Flow	Actual Flow	Back Pressure	Auxiliary Target Flow	Actual Flow	Back Pressure
0.70	0.71	302.49	2.00	1.99	114.98
Makeup Target Flow	Actual Flow	Back Pressure	Plasma Target Flow	Actual Flow	Back Pressure
2.00	1.99	122.88	18.00	17.97	23.89

RF Generator Test		Pass	
RF Power Supply Test	Passed		
RF Power Supply (V)	147.513		
RF Oscillator Test	Passed		
RF Oscillator Frequency (MHz)	25.776		
Work Coil Current (A)	46.364		
RF Power Supply Current (A)	2.001		

Camera Test		Pass	
	Integration Time (ms)	Standard Deviation	Status
Electronic Offset Test	1000	8.726	Passed
Dark Current Test	6000	0.844	Passed
Array Test	5	0.015	Passed
Linearity Test		0.069	Passed

Optics Test			Pass		
	Radial	Axial			
Intensity	2591000	2331609			
Wavelength	737.212	737.212			

Suwan O.
26 Aug 24

Suwan O.
26 Aug 24



Agilent CrossLab Start Up Services

Agilent 7890 Gas Chromatograph

Preventive Maintenance Checklist

Agilent Preventive Maintenance provides factory recommended service for your analytical instruments to assure reliable operation and the accuracy of your results.

Delivered by highly trained and certified service engineers using genuine Agilent parts and supplies, Agilent Preventive Maintenance provides everything you need to reduce unplanned downtime and keep your systems operating at their peak. This checklist will be completed at the end of the service and provided to you as a record of the preventive maintenance activities.

Introduction

Customer Information

- Customers should provide all necessary operating supplies upon request of the engineer.
- A customer representative should be available to the engineer while performing the preventive maintenance procedures.
- Any parts, not included in the Parts Lists section of this document, are not part of the recommended Preventive Maintenance service, nor are they included in the price of this service.
- If a system requires the use of extra or special procedures and/or parts for the maintenance service, then these must be ordered separately and charged as a repair, which may incur additional costs.

Important Customer Web Links

- For more information about **Agilent Technologies services**, please visit our website using the following URL: <http://www.agilent.com/en-us/products/crosslab-instrument-services/service-repair>
- The **Agilent Community** is an excellent place to get answers, collaborate with others about applications and Agilent products, and find in-depth documents and videos relevant to Agilent technologies. Visit <https://community.agilent.com/welcome>.
- To access **Agilent University**, visit <http://www.agilent.com/crosslab/university/> to learn about training options, which include online, classroom and onsite delivery. A training specialist can work directly with you to help determine your best options.
- A useful **Agilent Resource Center** web page is available, which includes short videos on maintenance, quick lists of consumables for new instruments, and other valuable information. Check out the Resource Page here: <https://www.agilent.com/en-us/agilentresources>.
- Need technical support, FAQs, supplies? – visit our **Support Home page** <http://www.agilent.com/search/support>.
- **Videos** about specific preparation requirements for your instrument can be found by searching the **Agilent YouTube** channel at <https://www.youtube.com/user/agilent>.
- **7890B Manuals** are also available on Agilent.com:
 - **Safety**
https://www.agilent.com/cs/library/usermanuals/public/7890B_Safety.pdf
 - **Installation and First Startup**
https://www.agilent.com/cs/library/usermanuals/Public/7890B_Installation.pdf
 - **Operation Manual**
https://www.agilent.com/cs/library/usermanuals/Public/7890B_Operation.pdf
 - **Maintaining Your GC**
https://www.agilent.com/cs/library/usermanuals/public/G3430-90052%207890B_Maintaining%20Guide.pdf



Service Engineer's Responsibilities

- Contact the customer and ensure that all necessary supplies are available before the preventive maintenance visit.
- Only select those pages that relate to the system or module being serviced.
- Complete empty fields with the relevant information.
- Complete the relevant checkboxes in the checklist using either a "X" or tick mark "✓".
- Check "Section not applicable" check boxes to indicate services/tasks not delivered, as appropriate.
- Complete the Preventive Maintenance service in the order of the tasks listed.
- Complete the Service Review section together with the customer.
- Complete the fields for page numbers at the foot of each selected page
- Complete the total number of pages field in the Service Completion section
- **Ask the customer to sign the Service Completion section including the customer's and your signature.**

Additional Instruction Notes

- Check for any active service notes for this unit. If there are any applicable "Safety" or "Modification Recommended" Service notes, plan to implement the changes on this unit before doing any qualification service.
- Do not implement firmware updates, unless you get approval from the customer and are sure that they are compatible with the instrument control software.

System Information

- ☐ Check this box if an instrument configuration report is attached instead of completing the table below.

Instrument System Name and ID	7890A GC System
Instrument System Site and Location	SECOT CO., LTD.

List System Component Product Numbers	List the Serial Numbers of each Component
1. G3440B	CN15343147
2. G4513A	CN11350133
3. G4514A	CN13080006
4. N/A	N/A
5. N/A	N/A
6. N/A	N/A
7. N/A	N/A
8. N/A	N/A
9. N/A	N/A
10. N/A	N/A

Preparation

- ✓ Discuss any specific issues with the customer before starting.
- ✓ Review the instrument logbook for recorded problems and comments.
- ✓ Save instrument control settings before starting the procedure.
- ✓ Perform a general inspection of the system for cleanliness.
- ✓ Check for proper installation of parts, assemblies, sensors etc.
- ✓ Check system for required installation of components, settings as defined by current Service Notes.
- ✓ Check for required firmware updates and verify with customers if they would like them installed.
- ☐ Before starting the following procedures, record the Detector Signal Output(s) in the results table. If the GC is turned OFF or in a service mode, comparing the detector outputs before and after the service is not possible.

Preventive Maintenance Procedure

Clean and inspect GC

- ✓ Unplug power cord from the power source.
- ✓ Open GC covers and vacuum/remove any dust/debris. Pay particular attention to cooling fans.
- ✓ Inspect internal connectors for proper contact and placement.
- ✓ Reconnect Power to the GC. Power the GC on and verify the power on self-test passed.
- ✓ Verify oven motor spins freely and turns on with the oven door closed; off when the door is opened.
- ✓ Verify operation of all other fans - the inlet and EPC cooling fans.
- ✓ Verify oven intake/outlet flap assembly is operating smoothly while heating and cooling the oven

Inlet and detector consumable replacement

- ✓ For the inlets installed, perform inlet maintenance as defined in the 7890 manual – "Maintaining Your GC" - for the inlet(s) installed.
- ✓ Replace the split vent trap cartridge filter on units with these inlets: Split/Splitless Capillary (SSL), Multi-Mode Inlet (MMI), Programmed Temperature Vaporizer (PTV), Volatiles Interface (VI).
- ✓ If the inlet system is used in Split Mode with viscous samples, inspect and clean the split vent tube on the inlet and flush or replace the tubing between the inlet and the split vent trap.
- ✓ If the GC includes a Flame Ionization Detector (FID), replace the jet. If the ignitor shows any buildup of sample or corrosion, replace the ignitor. Examine the FID collector and castle assemblies for contamination – clean as necessary.

Zero Sensors and Leak test

- ✓ Zero all pressure sensors per the procedure in the 7890 "Advanced User Guide".
- ✓ Perform inlet pressure decay test(s) as defined in the 7890 "Troubleshooting Manual".
If the PM is done in preparation for an Operational Qualification, then the pressure decay test defined within that protocol can be used for the PM.
- ✓ Record if test passed or failed in the results table.

ALS Maintenance

- ☐ **Section NOT applicable**
- ✓ Check all cabling and configuration settings between GC, tray, and injectors.
- ✓ Vacuum or remove any dust, especially around fans.
- ✓ Check operation of all fans.
- ✓ Check syringe for smooth plunger operation.
- ✓ Check for smooth operation of the needle support – clean if necessary

Restore Instrument

- ✓ Restore the normal operating conditions or customer method using the Data System.
- ✓ Purge the system with carrier flow for 15 minutes
- ✓ Bake out the system, then restore the normal operating conditions
- ✓ After equilibration, check and record the post PM detector signal output values.
Results should be similar or lower than the detector outputs recorded prior to PM.
- ✓ Perform a chemical checkout. If this is a routine PM, inject the customer's sample using the ALS if applicable. This will act as a final checkout of both the ALS and the GC.

Note: If the PM Service is performed prior to a qualification service, then use the qualification procedure as a guide for final instrument set up and checkout.

Signature Page

Service Review

- ☒ Attach available reports/printouts of all tests to this documentation.
- ☒ Record the Preventive Maintenance service activity in the customer's records/logbook.
- ☒ Update/reset instrument maintenance counters as appropriate.
- ☒ Affix the PM sticker to the system or instrument logbook based on the customer's request.
- ☒ Complete the Service Engineer Comments section if there are additional comments.
- ☒ Review with the customer this service, parts replaced, and test results obtained.
- ☐ If the instrument firmware was updated, record the details of the change in the Service Engineer's Comments box or if necessary, in the customer's IQ records.
- ☐ Supply the customer with a copy of the Smart Alerts flyer.
- ☐ Describe Smart Alerts to the customer.
- ☐ Install Smart Alerts if requested.

7890 GC Test Results Table

Detector Signal Outputs	Before PM Service	After PM Service
Front detector output uECD	-	180
Back detector output FID	-	15
AUX detector output	N/A	N/A
Pressure decay test	Expected test result	Actual test result
Front inlet pressure decay test	Pass	Pass
Back inlet pressure decay test	Pass	Pass

7890 Parts List Table

The following kits are recommended for capillary and purged packed inlets. If this is a general PM and the customer has a preferred set of consumables, you may use the customer's consumables.

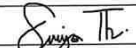
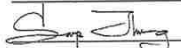
Part description	Part number	Product or model# where used	Quantity consumed
SSL Capillary Inlet PM kit, Splitless	5188-6497	7890A/B	2
SSL Capillary Inlet PM kit, split	5188-6496	7890A/B	N/A
SSL Capillary Ultra Inert Inlet Gold Seal with Washer	5190-6144	7890A/B	N/A
SSL Capillary Ultra Inert Inlet Splitless Liner - Single taper with Glass Wool	5190-2293	7890A/B	N/A
SSL Capillary Ultra Inert Inlet Low Pressure Drop Split Liner - with Glass Wool	5190-2295	7890A/B	N/A
PP Inlet PM kit	5188-6498	7890A/B	N/A
Split vent trap PM kit, single cartridge (for MMI, PTV & VI)	5188-6495	7890A/B	N/A
MMI Cleaning Kit	G3510-60820	7890A/B	N/A
PTV Septumless Head Rebuild Kit	5182-9747	7890A/B	N/A
PTV Septumless Head Teflon Guide	5182-9748	7890A/B	N/A
Ignitor (glow plug) assembly with O-ring	19231-60680	7890A/B	1
FID Collector Rebuild/Cleaning Kit	G1531-67000	7890A/B	N/A
Standard .011-inch FID Jet for capillary FID base	G1531-80560	7890A/B	N/A
High Temperature .018-inch FID Jet for capillary FID base	G1531-80620	7890A/B	N/A
Standard .018-inch FID Jet for packed column with packed FID base	18710-20119	7890A/B	N/A
Standard .011-inch FID Jet for capillary column with packed/adaptable FID base	19244-80560	7890A/B	N/A
High Temperature .018-inch FID Jet for capillary column with packed/adaptable FID base	19244-80620	7890A/B	N/A
NPD Jet, universal fit, .011-inch ID	G1534-80580	7890A/B	N/A
NPD Jet, universal fit, .011-inch ID Extended tip	G1534-80590	7890A/B	N/A
SSL Capillary Ultra Inert Inlet Gold Seal with Washer	5190-6144	7890A/B	N/A
SSL Capillary Ultra Inert Inlet Splitless Liner - Single taper with Glass Wool	5190-2293	7890A/B	N/A
**FID Collector Replacement Kit, if needed	G1531-67001	7890A/B	N/A

Service Engineer Comments

If there are any specific points you wish to note as part of performing the service or other items of interest for the customer, please write include them in this box.

N/A

Service Completion

Service request number 6006786001 Date service completed 23 May 2024
 Agilent signature  Customer signature 
 Total number of pages in this document 10

Do not include this section/page in the published, customer-facing PDF version.

This page is only relevant for Agilent source documents for document control purposes and is NOT intended for customer viewing. Refer to the SPIFPM checklist Authoring Guide for more information.

Document Control Logs

Revision Log

Revision	Date	Author	Reason for update
Revision of document	Date of Issuance	Author of document	Author to describe main features/changes made for this specific revision
1.0 Draft	4-Mar-2011	Dave Park	Migrated the content of revision A.01.05 to the new Agilent template. Reviewed by subject matter expert, Dave Park.
1.1 Draft	20-Jan-2015	Dave Park	Added Split Vent trap to MMI, PTV and VE - also PTV and FID PM Parts
1.2 Draft	31-March-2015	Dave Park	Added Ultra Inert Gold Seal and Liner to SS Consumables
A.01.11	10-Dec-2015	Dave Park	Added step to perform maintenance on the Split Vent Tube and .018" FID Jet part numbers - Fixed broken web links
2.00	30-Dec-2020	Gary Boardman	Updated New Template and terminology change: Familiarization to Introduction. Create New Agile Document Number: D0007063

Approval Log

Revision	Approver	Title of approver
Add revision number	Add approver name here	Add approver's function or title here
A.01.06	Don Gage	Product support manager
A.01.09	Kai Meng	Product support manager
A.01.10	Suneetha Tippireddy	Product support manager
A.01.11	Suneetha Tippireddy	Product support manager
2.00	Josh Roark	GC Product Support Manager

Designated Evaluation Log

Revision	Designated Evaluator (DE)	Title of DE	DE Number
Add revision number	Add name	Add function or title	Add DE number here
2.00	Michael Zumwalt	CrossLab Start Up Services Application Consulting Lead	44166.759722222

Agilent CrossLab Start Up Services

Agilent GCMS Preventive Maintenance Checklist



Agilent Preventive Maintenance provides factory recommended service for your analytical instruments to assure reliable operation and the accuracy of your results.

Delivered by highly trained and certified service engineers using genuine Agilent parts and supplies, Agilent Preventive Maintenance provides everything you need to reduce unplanned downtime and keep your systems operating at their peak. This checklist will be completed at the end of the service and provided to you as a record of the preventive maintenance activities.

Introduction

Select the appropriate PM to be done and then perform the checklist under that section

- ☐ Interim Preventive Maintenance 6 months
☒ Major Preventive Maintenance Yearly

This checklist covers the following model(s):

Type	Model
SQ	5973 Series MSD
SQ	5975 Series MSD
SQ	5977 Series MSD
TQ	7000 Series MS/MS
TQ	7010 Series MS/MS
QTOF	7200 Series QTOF
QTOF	7250 Series QTOF

Customer Information

- Customers should provide all necessary operating supplies upon request of the engineer.
- A customer representative should be available to the engineer while performing the preventive maintenance procedures. Customers are responsible for regular maintenance and are encouraged to observe the service representative.
- Any parts not included in the Parts Lists section of this document are not part of the recommended Preventive Maintenance service nor are they included in the price of this service.
- If a system requires the use of extra or special procedures and/or parts for the maintenance service, then these must be ordered separately and charged as a repair, which may incur additional costs.

Important Customer Web Links

- For more information about Agilent Technologies services, please visit our website using the following URL: <http://www.agilent.com/en-us/products/crosslab-instrument-services/service-repair>
- To access Agilent University, visit <http://www.agilent.com/crosslab/university/> to learn about training options, which include online, classroom and onsite delivery. A training specialist can work directly with you to help determine your best options.
- A useful Agilent Resource Center web page is available, which includes short videos on maintenance, quick lists of consumables for new instruments, and other valuable information. Check out the Resource Page here: <https://www.agilent.com/en-us/agilentresources>
- Need technical support, FAQs, supplies? – visit our Support Home page at <http://www.agilent.com/search/support>
- Get answers. Share insights. Build connections:
Join the Agilent Community at <https://community.agilent.com/welcome>

Service Engineer's Responsibilities

- Contact the customer and ensure that all necessary supplies are available before the preventive maintenance visit.
- Complete empty fields with the relevant information.
- Complete the relevant checkboxes in the checklist using either a "X" or tick mark "✓".
- Check "Section not applicable" check boxes to indicate services/tasks not delivered, as appropriate.
- Complete the Preventive Maintenance services in the most logical order relevant to the individual system service in the order of the tasks listed.
- Complete the Service Review section together with the customer.
- Ask the customer to sign the Service Completion section including the customer's and your signature.

Additional Instruction Notes

- Preventive maintenance is a factory recommended procedure designed to reduce the likelihood of electromechanical failures. Failure to perform preventive maintenance may reduce the long-term reliability of certain instruments and systems. **Two preventative maintenances (PMs) per year are recommended, the Major PM Service will be performed annually with an Interim PM performed 6 months after the Major PM.**

System Information

- ☐ Check this box if an instrument configuration report is attached instead of completing the table.

Instrument System Name and ID	5975C MSD
Instrument System Site and Location	SECOT Co., Ltd.

List System Component Product Numbers	List the Serial Numbers of each Component
1. G3172A	US74838080
2. N/A	N/A
3. N/A	N/A
4. N/A	N/A
5. N/A	N/A
6. N/A	N/A
7. N/A	N/A
8. N/A	N/A

Preparation

- ☒ Discuss any specific issues with the customer before starting.
- ☒ Review the instrument logbook for recorded problems and comments.
- ☒ Save instrument control settings before starting the procedure.
- ☒ Perform a general inspection of the system for cleanliness.
- ☒ Check for proper installation of parts, assemblies, sensors etc.
- ☒ Check system for required installation of components and settings as defined by current Service Notes
- ☒ Check for firmware updates and verify with customers if they would like them installed. Firmware update(s) are strongly recommended.

Customer Responsibilities

Customers should ensure that all necessary operating supplies, consumables, and usage-dependent items such as gases, vials, syringes, calibrant solution and solvents required for successful preventive maintenance are available. A customer representative should be available while the preventive maintenance is being performed.

Important notice for customers

The customer should complete the following before the Support Provider arrives on site:

- ✓ Perform an autotune and retain the printed tune report just prior to the start of the PM to verify performance of the equipment.

Note: It is recommended to have the customer run the autotune and tune evaluation prior to the PM and then start the vent cycle so that the instrument will be ready for the service representative.

Definition of the Task/Recommended items within the document

Task	Recommended	
Yes	No	Interim / Major / As needed
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> Yes selected means that the task was done or the part was required.
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/> No selected means that the task was not done or the part was not required.
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/> Interim selected means that this task is recommended to be done at 6-month intervals.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> Major selected means that this task is recommended to be done yearly; if the customer would like a service to be done at the 6-month interval then the service could be purchased.
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/> As needed selected means that the task was done or the part was used as needed. For example, there could be two types of filters that could be used and this was the one selected.

Preventive Maintenance Procedures

Yes/No	Interim/Major	Description
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Perform general inspection of system for cleanliness.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Discuss any problems the customer is having with the instrument.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Review customer maintenance records and exclude maintenance on recently serviced items.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Review the most recent autotune report. This will give a starting point for evaluating spectral peaks, baseline noise, peak shape, mass assignments and resolution.

Yes/No	Interim/Major	GCMS
Yes/No	Interim/Major	Description
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Record Instrument model no.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Record Instrument serial no.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Record Rough Vacuum
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Record Manifold Vacuum
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Type of Column installed

Yes/No	Interim/Major	System Checks
Yes/No	Interim/Major	Description
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Verify that calibration peaks were seen prior to starting the PM.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Vent the instrument.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Inspect vacuum hoses, pump, exhaust tubing, and power cords for excessive wear.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Visually inspect calibrant levels – PFTBA PFDTD (if appl.), IRM (if appl.). Refill if available.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Look for any obvious external damage or problems.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Clean air intake(s). Cosmetic cover(s) may need to be removed.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Verify system line voltage meets instrument specifications: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>

Yes/No	Interim/Major	Wet Mechanical vacuum pumps
Yes/No	Interim/Major	Description
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Check for evidence of oil leakage. Check pump gasket for leakage.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Drain and replace mechanical pump oil.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Replace Oil Mist Filter if applicable.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Discuss with customer the need for more frequent oil changes if the oil is dirty.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Don't use mist filters with Chemical Ionization.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Perform anti-suckback valve test. Power on until side plate is held closed, power off and check that side plate holds closed. Visually confirm that no oil returns up vacuum hose.
Yes/No	Interim/Major	Dry Mechanical vacuum pumps - Diaphragm
Yes/No	Interim/Major	Description
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Check for evidence of poor vacuum – Turbo power demand, poor manifold vacuum, etc.
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Clear air flow paths of dust.
<input type="checkbox"/>	<input checked="" type="checkbox"/>	If vacuum is poor, then replace the diaphragm pump.
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Perform anti-suckback valve test. Power on until side plate is held closed, power off and check that side plate holds closed.

Yes/No	Interim/Major	Dry Mechanical vacuum pumps - Scroll
Yes/No	Interim/Major	Description
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Replace the tips seal on the IDP pump.
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Check for evidence of poor vacuum – Turbo power demand, poor manifold vacuum, etc.
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Replace the Exhaust Filter if required.
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Discuss with customer the need for more frequent changes, if needed.
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Inform customer that pump gas ballast should be installed all the time.
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Perform anti-suckback valve test. Power on until side plate is held closed, power off and check that side plate holds closed.

Yes/No	Interim/Major	Cleaning System and Filters
Yes/No	Interim/Major	Description
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Fans
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Remove dust from fans and vent covers.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Verify fans are functional and that there is enough space around the instrument for proper cooling.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Source cleaning
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Open analyzer and remove the source.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Disassemble, Clean, Re-assemble source.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Re-install source and close analyzer.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Filters
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Replace RMSH-2 Helium gas filter – if applicable.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Replace RMSN-2 Nitrogen gas filter – if applicable.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Replace RMSHY-2 Hydrogen gas filter – if applicable.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	CP17988 – Gas Clean Carrier Gas Kit for 7890 for Nitrogen or Helium; Bracket, Mount, and Filter – if applicable.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	CP17974 – Gas Clean Filter Kit GC/MS 1/8"; Mount and Filter – if applicable.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	CP17973 – Gas Clean Filter; Replacement Filter – if applicable.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	S190-9071 – Methane Gas Filter – if applicable.

Guidance: If gas filter is replaced, write the change date on the filter using a permanent marker.

System post-check			
Yes/No	Interim/Major	Description	
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Pump system back down. Wait until system stability has been achieved.	
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Verify system vacuum reading(s) via the gauge controller.	
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Leak Check	
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Verify system in manual tune	
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Compare against previous tune file report(s)	
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Change to Tune and verify that all temperatures, pressures, and gas flows reach method set points	
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Check manually that you have calibration peaks.	
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Autotune Performed	

Guidance: If the PM Service is performed prior to a qualification service, then use the qualification procedure as a guide for final instrument setup and checkout.

Service Review

- ☒ Attach available reports/printouts of all tests to this documentation.
- ☒ Record the Preventive Maintenance service activity in the customer's records/logbook. Record the PM event in the Smart Alerts logbook, if applicable.
- ☒ Update/reset instrument maintenance counters as appropriate.
- ☒ Affix the PM sticker to the system or instrument logbook based on the customer's request.
- ☒ Complete the Service Engineer Comments section if there are additional comments.
- ☒ Review this service, parts replaced, and test results obtained with the customer.
- ☐ If the instrument firmware was updated, record the details of the change in the Service Engineer's Comment box. Systems in a compliant environment may need additional documentation.

Agilent Test Results Table

Test Description	Expected Test Result	Actual Test Result
Atune and Evaluation	Pass	Pass
N/A	N/A	N/A

Agilent Consumed Parts List Table

☐ Section not applicable

Part Description	Part Number	Product or Model# where used	Quantity consumed
Agilent Vacuum Fluid	5191-5851	Rough Pump	1
N/A	N/A	N/A	N/A

Signature Page

Service Engineer Comments (optional)

If there are any specific points you wish to note as part of performing the installation or other items of interest for the customer, please write in this box.

N/A

Service Completion

Service request number 6006807458 Date service completed 12 Jun 2024

Agilent signature Smryn Th. Customer signature Siriman C.

Total number of pages in this document 12

Parts – As needed as part of the PM

Common MS Filters and Seals – 5973/5975/5977/7000/7010/7200/7250 Series

Supplies			
Yes/No	Interim/Major/As needed	Description	Part number
<input type="checkbox"/>	<input type="checkbox"/>	Helium gas filter – if required	RMSH-2
<input type="checkbox"/>	<input type="checkbox"/>	Nitrogen gas filter – if required	RMSN-2
<input type="checkbox"/>	<input type="checkbox"/>	Big Universal Trap, 1/8" fittings, Hydrogen, if required	RMSHY-2
<input type="checkbox"/>	<input type="checkbox"/>	Gas Clean Carrier Gas Kit for 7890 for Nitrogen or Helium; Bracket, Mount and Filter – if required	CP17988
<input type="checkbox"/>	<input type="checkbox"/>	Gas Clean Filter Kit GC/MS 1/8 in (complete replacement kit) – if required	CP17974
<input type="checkbox"/>	<input type="checkbox"/>	Gas Clean GS/MS Filter – if required	CP17973
<input type="checkbox"/>	<input type="checkbox"/>	Chemical Ionization Gas Purifier (CI systems) – if required	5190-9071
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Agilent AVF Platinum, 1 quart	5191-5851

Gas filters need to be changed only if required

MS Maintenance Supplies for 5973/5975/5977 Series

Supplies			
Yes/No	Interim/Major/As needed	Description	Part number
<input type="checkbox"/>	<input type="checkbox"/>	Diffusion pump fluid (Diffusion Pump Models)	6040-0809 Qty 2
<input type="checkbox"/>	<input type="checkbox"/>	IDP-3 Tip Seal Replacement Kit (IDP-3 Dry Pump Models)	G7077-67018
<input type="checkbox"/>	<input type="checkbox"/>	IDP-3 Tip Seal Replacement Kit (no tools – CSD P/N)	5190-9561
<input type="checkbox"/>	<input type="checkbox"/>	IDP-3 Tip Seal Replacement Kit (no tools – VPD P/N)	IDP3TS
<input type="checkbox"/>	<input type="checkbox"/>	Filter element for IDP-3	REPLSLRFILTER2
<input type="checkbox"/>	<input type="checkbox"/>	DS42 Oil Mist Eliminator 3/4G & 3/8	SR03706556
<input type="checkbox"/>	<input type="checkbox"/>	Exhaust oil mist trap (thread) Edwards/Pfeiffer	G1099-80039

MS Maintenance Supplies for 7000/7010 Series

Supplies			
Yes/No	Interim/Major/As needed	Description	Part number
<input type="checkbox"/>	<input type="checkbox"/>	Nitrogen gas filter	RMSN-2
<input type="checkbox"/>	<input type="checkbox"/>	IDP-10 Tip Seal Replacement Kit (IDP-10 Dry Scroll Pump Models)	G7004-67023
<input type="checkbox"/>	<input type="checkbox"/>	IDP-10 Tip Seal Replacement Kit (no tools – VPD P/N)	X3807-67000
<input type="checkbox"/>	<input type="checkbox"/>	Oil Mist Filter RV5	G6600-80043
<input type="checkbox"/>	<input type="checkbox"/>	Filter element for the IDP-10	REPLSLRFILTER1

MS Maintenance Supplies for 7200/7250 Series

Supplies			
Yes/No	Interim/Major/As needed	Description	Part number
<input type="checkbox"/>	<input type="checkbox"/>	Nitrogen gas filter – if required	RMSN-2
<input type="checkbox"/>	<input type="checkbox"/>	RIS Probe Maintenance Kit (7200 Series only)	G7005-60170
<input type="checkbox"/>	<input type="checkbox"/>	DS202 Oil Mist Eliminator	SR03706800
<input type="checkbox"/>	<input type="checkbox"/>	IDP-15 Tip Seal Replacement Kit (IDP-15 Dry Pump Models)	5190-9613
<input type="checkbox"/>	<input type="checkbox"/>	IDP-15 Tip Seal Replacement Kit (no tools – VPD P/N)	X3815-67000
<input type="checkbox"/>	<input type="checkbox"/>	Filter element for SH-110/SH-112/IDP-15 exhaust silencer	REPLSLRFILTER
<input type="checkbox"/>	<input type="checkbox"/>	DS 3/8 MAG. PLUG AND GASKET	SR03701824

MS Maintenance Supplies for JetClean

Supplies			
Yes/No	Interim/Major/As needed	Description	Part number

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Big Universal Trap, 1/8" fittings, Hydrogen, if required	RMSHY-2
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Consumable Parts Reference – Purchasable by customer, not included as part of PM

Common MSD Maintenance Supplies 5973/5975/5977/7000/7010/7200/7250 Series

Yes/No	Interim/Major/As needed	Description	Part number
<input checked="" type="checkbox"/>	<input type="checkbox"/>	El High Temperature Filaments	G7005-60061 Qty 2
<input type="checkbox"/>	<input type="checkbox"/>	HES El Filaments	G7002-60001
<input type="checkbox"/>	<input type="checkbox"/>	LE-El Filaments	G8850-60021
<input type="checkbox"/>	<input type="checkbox"/>	Cl High Temperature Filament – all MSDs	G7005-60072
<input type="checkbox"/>	<input type="checkbox"/>	PFTBA GCMS Tuning Standard calibrant	05971-60571
<input type="checkbox"/>	<input type="checkbox"/>	PFDTD calibrant, 1 mL	8500-8510
<input type="checkbox"/>	<input type="checkbox"/>	PFET, IRM calibrant for GC QTOF 0.5 mL	S190-0531

MSD Maintenance Supplies 5973/5975/5977 Series

Yes/No	Interim/Major/As needed	Description	Part number
<input type="checkbox"/>	<input type="checkbox"/>	Cl Interface tip seal (tip and spring combo)	G1999-60412
<input type="checkbox"/>	<input type="checkbox"/>	Cl Interface tip seal (tip only)	G3870-20542
<input type="checkbox"/>	<input type="checkbox"/>	Cl Interface tip seal spring (spring only)	G1999-20023
<input type="checkbox"/>	<input type="checkbox"/>	Repeller insulator	G1099-20133 Qty 2
<input type="checkbox"/>	<input type="checkbox"/>	Lens insulator/holder (HES)	G7002-20074
<input type="checkbox"/>	<input type="checkbox"/>	Ring heater/sensor assembly (HES)	G7002-60043
<input type="checkbox"/>	<input type="checkbox"/>	Ceramic insulator for Extractor (HES)	G7002-20064
<input type="checkbox"/>	<input type="checkbox"/>	Transfer-Line Tip Cap, Threaded	G3870-20547
<input type="checkbox"/>	<input type="checkbox"/>	Transfer-Line Tip Base, Threaded	G3870-20548

MS Maintenance Supplies for 7000/7010 Series

Yes/No	Interim/Major/As needed	Description	Part number
<input type="checkbox"/>	<input type="checkbox"/>	Cl Interface tip seal - 7000	G1999-60412
<input type="checkbox"/>	<input type="checkbox"/>	Cl Interface tip seal - 7010	G7002-60412
<input type="checkbox"/>	<input type="checkbox"/>	Cl Interface tip seal (tip only)	G3870-20542
<input type="checkbox"/>	<input type="checkbox"/>	Cl Interface tip seal spring (spring only)	G1999-20023
<input type="checkbox"/>	<input type="checkbox"/>	Repeller Insulator - 7000	G1099-20133 Qty 2
<input type="checkbox"/>	<input type="checkbox"/>	Lens insulator/holder (HES)	G7002-20074
<input type="checkbox"/>	<input type="checkbox"/>	Ring heater/sensor assembly (HES)	G7002-60043
<input type="checkbox"/>	<input type="checkbox"/>	Ceramic insulator for Extractor (HES)	G7002-20064
<input type="checkbox"/>	<input type="checkbox"/>	Transfer-Line Tip Cap, Threaded	G3870-20547
<input type="checkbox"/>	<input type="checkbox"/>	Transfer-Line Tip Base, Threaded	G3870-20548

MS Maintenance Supplies for 7200 Series

Yes/No	Interim/Major/As needed	Description	Part number
<input type="checkbox"/>	<input type="checkbox"/>	Extractor Lens Insulator	G7005-20133
<input type="checkbox"/>	<input type="checkbox"/>	Ion Focus Insulator	G7005-20442
<input type="checkbox"/>	<input type="checkbox"/>	Ring Heater/Sensor Assembly	G7005-60110
<input type="checkbox"/>	<input type="checkbox"/>	RIS Xfer Tip	G7005-20542
<input type="checkbox"/>	<input type="checkbox"/>	RIS Xfer Tip Spring	G7005-20024

MS Maintenance Supplies for 7250 Series

Yes/No	Interim/Major/As needed	Description	Part number
<input type="checkbox"/>	<input type="checkbox"/>	Lens insulator/holder (HES)	G7002-20074
<input type="checkbox"/>	<input type="checkbox"/>	Ring heater/sensor assembly (HES)	G7002-60043
<input type="checkbox"/>	<input type="checkbox"/>	Ceramic insulator for Extractor (HES)	G7002-20064
<input type="checkbox"/>	<input type="checkbox"/>	Transfer-Line Tip Cap, Threaded	G3870-20547
<input type="checkbox"/>	<input type="checkbox"/>	Transfer-Line Tip Base, Threaded	G3870-20548
<input type="checkbox"/>	<input type="checkbox"/>	El Extractor Transfer Tip	G3870-20542
<input type="checkbox"/>	<input type="checkbox"/>	Cl Tip Compression Spring	G1999-20023

MS Maintenance Supplies for Intuvo 9000 MS Systems

Yes/No	Interim/Major/As needed	Description	Part number
<input type="checkbox"/>	<input type="checkbox"/>	Swaged MS Tail - Packaged	G4590-60009
<input type="checkbox"/>	<input type="checkbox"/>	Swaged MS Tail (HES) - Packaged	G4590-60109

Common MS Maintenance Supplies

Yes/No	Interim/Major/As needed	Description	Part number
<input type="checkbox"/>	<input type="checkbox"/>	Abrasive paper, 30 um	5061-5896
<input type="checkbox"/>	<input type="checkbox"/>	Alumina powder	393706201
<input type="checkbox"/>	<input type="checkbox"/>	Cloths, clean (pkg of 15)	05980-60051
<input type="checkbox"/>	<input type="checkbox"/>	Cloths, cleaning (pkg of 300)	9310-4828
<input type="checkbox"/>	<input type="checkbox"/>	Cotton swabs (pkg of 100)	5080-5400
<input type="checkbox"/>	<input type="checkbox"/>	Gloves, clean, large	8650-0030
<input type="checkbox"/>	<input type="checkbox"/>	Gloves, clean, small	8650-0029

ภาคผนวก จ

หนังสืออนุญาตขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน
จากกรมโรงงานอุตสาหกรรม



ที่ อก ๐๓๑๐(๑)/ ๑๑ ๐๑ ๖

กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท
เขตราชเทวี กรุงเทพฯ ๑๐๔๐๐

๒๐ กรกฎาคม ๒๕๖๖

เรื่อง ต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

เรียน กรรมการผู้จัดการ บริษัท ซีคอต จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกชน
ลงวันที่ ๗ เมษายน ๒๕๖๖

- สิ่งที่ส่งมาด้วย ๑. รายชื่อผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์ จำนวน ๑ แผ่น
๒. รายชื่อเจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๑ แผ่น
๓. ขอบข่ายสารมลพิษที่ได้รับขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๓๙ แผ่น

ตามหนังสือที่อ้างถึง บริษัท ซีคอต จำกัด ขอต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ว-๒๓๙ สถานที่ ตั้งเลขที่ ๒๓๙ ถนนริมคลองประปา แขวงบางซื่อ เขตบางซื่อ กรุงเทพมหานคร ต่อกรมโรงงานอุตสาหกรรม นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้บริษัท ซีคอต จำกัด ต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน โดยมีองค์ประกอบดังนี้

- ก. ผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์ จำนวน ๑๐ ราย ตามสิ่งที่ส่งมาด้วย ๑
ข. เจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๓๘ ราย ตามสิ่งที่ส่งมาด้วย ๒
ค. ขอบข่ายสารมลพิษที่ได้รับขึ้นทะเบียนให้วิเคราะห์ในน้ำเสีย น้ำใต้ดิน อากาศเสีย สิ่งปฏิกูล หรือวัสดุที่ไม่ใช่แล้ว และดิน ตามสิ่งที่ส่งมาด้วย ๓

หนังสือฉบับนี้จะหมดอายุในวันที่ ๒ พฤษภาคม ๒๕๖๙ หากประสงค์จะต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน ให้ยื่นคำขอต่ออายุพร้อมเอกสารประกอบคำขอต่อกรมโรงงานอุตสาหกรรมภายใน ๓๐ วัน ก่อนวันสิ้นอายุของหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน ซึ่งคำขอต่ออายุดังกล่าวขอรับได้ที่กรมโรงงานอุตสาหกรรม ทั้งนี้ สามารถยื่นคำขอผ่านระบบอิเล็กทรอนิกส์ได้ ที่หน้าเว็บไซต์กรมโรงงานอุตสาหกรรม

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

(นายประสม ดำรงพงษ์)

กองวิจัยและเตือนภัยมลพิษโรงงาน
กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษและทะเบียนห้องปฏิบัติการ
โทร. ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๐๓-๕
โทรสาร ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๙๙
ไปรษณีย์อิเล็กทรอนิกส์ saraban@diw.mail.go.th



“อุตสาหกรรมก้าวไกล ประเทศไทยก้าวหน้า ร่วมกันพัฒนา อุตสาหกรรมสีเขียว”



ส่งที่ส่งมาด้วย ๑

เอกสารแนบท้ายหนังสือรับต่ออายุขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

บริษัท ซีคอต จำกัด

เลขทะเบียน ว-๒๓๙

ที่ อก ๐๓๑๐(๑)/ ๑๑ ๐๑ ๖

ลงวันที่ ๒๐ กรกฎาคม ๒๕๖๖

ก. ผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์ จำนวน ๑๐ ราย

- ๑) นายขรรชัย เกรียงไกรอุดม
๒) นางสมฤดี เกรียงไกรอุดม
๓) นางอารยา ทิพักษ์
๔) นางสาวเขมขุดา อินทร์ศร
๕) นางสาวปริดา สมใจ
๖) นางสาวอริญา มาตา
๗) นางสาวลดาวัลย์ วงศ์เจริญ
๘) นางสาวมณีนวรัตน์ เกตวันดี
๙) นางสาวนริสา ภูวสรเพ็ชญ์
๑๐) นางสาวศิริวรรณ นิยมสง่า

- ทะเบียนเลขที่ ว-๒๓๙-ก-๐๐๐๒
ทะเบียนเลขที่ ว-๒๓๙-ก-๐๐๐๓
ทะเบียนเลขที่ ว-๒๓๙-ก-๐๐๐๔
ทะเบียนเลขที่ ว-๒๓๙-ก-๐๐๐๕
ทะเบียนเลขที่ ว-๒๓๙-ก-๐๐๐๖
ทะเบียนเลขที่ ว-๒๓๙-ก-๐๐๐๗
ทะเบียนเลขที่ ว-๒๓๙-ก-๐๐๐๘
ทะเบียนเลขที่ ว-๒๓๙-ก-๐๐๐๙
ทะเบียนเลขที่ ว-๒๓๙-ก-๐๐๑๐
ทะเบียนเลขที่ ว-๒๓๙-ก-๐๐๑๑

เอกสารแนบท้ายหนังสือรับต่ออายุขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

บริษัท ซีคอฟ จำกัด

เลขทะเบียน ว-๒๓๙

ที่ อก ๐๓๑๐(๑)/ ๑๑ ๐๑ ๖

ลงวันที่ ๒๐ กรกฎาคม ๒๕๖๖

ข. เจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๓๘ ราย

๑) นางสาวสุดาพร สุนทร	ทะเบียนเลขที่	ว-๒๓๙-จ-๐๐๐๑
๒) นางสาวสุธาทิพย์ เทียนเตี้ย	ทะเบียนเลขที่	ว-๒๓๙-จ-๐๐๐๓
๓) นางสาวสุนันทา ศิริคุณานานท์	ทะเบียนเลขที่	ว-๒๓๙-จ-๐๐๐๔
๔) นายบวร ดิษฐ์ยะ	ทะเบียนเลขที่	ว-๒๓๙-จ-๐๐๐๕
๕) นางสาวเกศรินทร์ วรเดชวิทยา	ทะเบียนเลขที่	ว-๒๓๙-จ-๐๐๐๖
๖) นายอนันต์ วัฒนินา	ทะเบียนเลขที่	ว-๒๓๙-จ-๐๐๐๗
๗) นายจิตพล สมประสงค์	ทะเบียนเลขที่	ว-๒๓๙-จ-๐๐๐๘
๘) นางสาวศศิธร พรหมประเสริฐ	ทะเบียนเลขที่	ว-๒๓๙-จ-๐๐๐๙
๙) นายศิวะนนท์ กลุวงษ์	ทะเบียนเลขที่	ว-๒๓๙-จ-๐๐๑๐
๑๐) นางสาวอลิษา คณิธรานนท์	ทะเบียนเลขที่	ว-๒๓๙-จ-๐๐๑๑
๑๑) นางสาวสิริวรรณ แก้วชิงดวง	ทะเบียนเลขที่	ว-๒๓๙-จ-๐๐๑๒
๑๒) นางสาวปัทมวรรณ สุวรรณวิโรจน์	ทะเบียนเลขที่	ว-๒๓๙-จ-๐๐๑๓
๑๓) นางสาวกนิษฐา เจริญเชื้อ	ทะเบียนเลขที่	ว-๒๓๙-จ-๐๐๑๔
๑๔) นายวัชรภรณ์ ประมาคเต	ทะเบียนเลขที่	ว-๒๓๙-จ-๐๐๑๕
๑๕) นายชอง เสงฆ์วัลกุล	ทะเบียนเลขที่	ว-๒๓๙-จ-๐๐๑๖
๑๖) นางสาวกฤษณา จันทุม	ทะเบียนเลขที่	ว-๒๓๙-จ-๐๐๑๗
๑๗) นางสาวพรนภา บุตรธรรม	ทะเบียนเลขที่	ว-๒๓๙-จ-๐๐๑๘
๑๘) นางสาวธาริณี อาจปิลิว	ทะเบียนเลขที่	ว-๒๓๙-จ-๐๐๑๙
๑๙) นายธนโชติ ช่างลื้อ	ทะเบียนเลขที่	ว-๒๓๙-จ-๐๐๒๐
๒๐) นางสาวพัชรา สมานฉันท	ทะเบียนเลขที่	ว-๒๓๙-จ-๐๐๒๑
๒๑) นางสาวจุฑารัตน์ แจ่มเรือน	ทะเบียนเลขที่	ว-๒๓๙-จ-๐๐๒๒
๒๒) นางสาวจณิสตา กุ้ยอ่อน	ทะเบียนเลขที่	ว-๒๓๙-จ-๐๐๒๓
๒๓) นายกิตติพงษ์ ณะเกิงสุข	ทะเบียนเลขที่	ว-๒๓๙-จ-๐๐๒๔
๒๔) นายจิรวัฒน์ โคตรคำหาญ	ทะเบียนเลขที่	ว-๒๓๙-จ-๐๐๒๕
๒๕) นายชนะพล อัครผล	ทะเบียนเลขที่	ว-๒๓๙-จ-๐๐๒๖
๒๖) นางสาวทิพย์สุดา วรรณการ	ทะเบียนเลขที่	ว-๒๓๙-จ-๐๐๒๗
๒๗) นายสิทธิชัย สว่างวงศ์ไชย	ทะเบียนเลขที่	ว-๒๓๙-จ-๐๐๒๘
๒๘) นายพิษณุ สีนามเพ็ง	ทะเบียนเลขที่	ว-๒๓๙-จ-๐๐๒๙
๒๙) นายรัตนชัย ขอบทำกิจ	ทะเบียนเลขที่	ว-๒๓๙-จ-๐๐๓๐
๓๐) นายธนาวุฒิ ค่วนแสง	ทะเบียนเลขที่	ว-๒๓๙-จ-๐๐๓๑
๓๑) นายณัฐชัย ไชยโคตร	ทะเบียนเลขที่	ว-๒๓๙-จ-๐๐๓๒
๓๒) นายณัฐดนัย กฤษณะโสม	ทะเบียนเลขที่	ว-๒๓๙-จ-๐๐๓๓
๓๓) นายศุภชัย สุขใหม่	ทะเบียนเลขที่	ว-๒๓๙-จ-๐๐๓๔
๓๔) นายรอมฎอน เหลี่ยมหมาด	ทะเบียนเลขที่	ว-๒๓๙-จ-๐๐๓๕
๓๕) นางสาวสุภาวดี บัวแก้ว	ทะเบียนเลขที่	ว-๒๓๙-จ-๐๐๓๖
๓๖) นางสาวมาธิยาณี อาแว	ทะเบียนเลขที่	ว-๒๓๙-จ-๐๐๓๗
๓๗) นางสาววิระยา ปัจฉิมบุรณ์	ทะเบียนเลขที่	ว-๒๓๙-จ-๐๐๓๘
๓๘) นางสาวศลิษา อินทรีย์	ทะเบียนเลขที่	ว-๒๓๙-จ-๐๐๓๙

วิมล

เอกสารแนบท้ายหนังสือรับต่ออายุขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

บริษัท ซีคอฟ จำกัด

เลขทะเบียน ว-๒๓๙

ที่ อก ๐๓๑๐(๑)/ ๑๑ ๐๑ ๖

ลงวันที่ ๒๐ กรกฎาคม ๒๕๖๖

ขอขยายสารมลพิษที่ได้รับขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๓๕๕ รายการ

น้ำเสีย จำนวน 45 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Aldrin	1) Liquid-Liquid Extraction, Gas Chromatographic Method ^[4]
2	Arsenic	2) Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
3	Barium	1) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^[4]
4	α -BHC	2) Digestion, Inductively Coupled Plasma Method ^[4]
5	β -BHC	1) Digestion, Direct Nitrous Oxide-Acetylene Flame Method ^[4]
6	δ -BHC	2) Digestion, Inductively Coupled Plasma Method ^[4]
7	γ -BHC	1) Liquid-Liquid Extraction, Gas Chromatographic Method ^[4]
		2) Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]

วิมล

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
8	Biochemical Oxygen Demand	1) 5-Day BOD Test, Azide Modification Method ^[4] 2) 5-Day BOD Test, Membrane Electrode Method ^[4]
9	Cadmium	1) Digestion, Direct Air-Acetylene Flame Method ^[4] 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method ^[4] 3) Digestion, Inductively Coupled Plasma Method ^[4]
10	Chemical Oxygen Demand	1) Open Reflux, Titrimetric method ^[4] 2) Closed Reflux, Colorimetric method ^[4] 3) Closed Reflux, Titrimetric Method ^[4]
11	Chlordane	1) Liquid-Liquid Extraction, Gas Chromatographic Method ^[4] 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[4]
12	Chromium	1) Digestion, Direct Air-Acetylene Flame Method ^[4] 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method ^[4] 3) Digestion, Inductively Coupled Plasma Method ^[4]
13	Color	ADMI Weighted-Ordinate Spectrophotometric Method ^[4]
14	Copper	1) Digestion, Direct Air-Acetylene Flame Method ^[4] 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method ^[4] 3) Digestion, Inductively Coupled Plasma Method ^[4]
15	Cyanide	Distillation, Colorimetric method ^[4]
16	4,4'-DDD	1) Liquid-Liquid Extraction, Gas Chromatographic Method ^[4] 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[4]

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
17	4,4'-DDE	1) Liquid-Liquid Extraction, Gas Chromatographic Method ^[4] 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[4]
18	4,4'-DDT	1) Liquid-Liquid Extraction, Gas Chromatographic Method ^[4] 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[4]
19	Dieldrin	1) Liquid-Liquid Extraction, Gas Chromatographic Method ^[4] 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[4]
20	Endosulfan I	1) Liquid-Liquid Extraction, Gas Chromatographic Method ^[4] 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[4]
21	Endosulfan II	1) Liquid-Liquid Extraction, Gas Chromatographic Method ^[4] 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[4]
22	Endosulfan Sulfate	1) Liquid-Liquid Extraction, Gas Chromatographic Method ^[4] 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[4]
23	Endrin	1) Liquid-Liquid Extraction, Gas Chromatographic Method ^[4] 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[4]
24	Endrin Aldehyde	1) Liquid-Liquid Extraction, Gas Chromatographic Method ^[4] 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[4]

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
25	Formaldehyde	Distillation, Colorimetric Method ^[3]
26	Free Chlorine	1) Iodometric Method ^[4] 2) DPD Colorimetric Method ^[4]
27	Heptachlor	1) Liquid-Liquid Extraction, Gas Chromatographic Method ^[4] 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[4]
28	Heptachlor epoxide	1) Liquid-Liquid Extraction, Gas Chromatographic Method ^[4] 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[4]
29	Hexavalent Chromium	1) Colorimetric Method ^[4] 2) Extraction, Air-Acetylene Flame Method ^[4]
30	Lead	1) Digestion, Direct Air-Acetylene Flame Method ^[4] 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method ^[4] 3) Digestion, Inductively Coupled Plasma Method ^[4]
31	Manganese	1) Digestion, Direct Air-Acetylene Flame Method ^[4] 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method ^[4] 3) Digestion, Inductively Coupled Plasma Method ^[4]
32	Mercury	Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ^[4]
33	Methoxychlor	1) Liquid-Liquid Extraction, Gas Chromatographic Method ^[4] 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[4]
34	Nickel	1) Digestion, Direct Air-Acetylene Flame Method ^[4] 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method ^[4] <i>วิธี</i>

3) Digestion...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
		3) Digestion, Inductively Coupled Plasma Method ^[4]
35	Oil & Grease	1) Liquid-Liquid, Partition-Gravimetric Method ^[4] 2) Soxhlet Extraction Method ^[4]
36	pH	Electrometric Method ^[4]
37	Phenols	1) Distillation, Chloroform Extraction Method ^[4] 2) Distillation, Direct Photometric Method ^[4]
38	Selenium	1) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^[4] 2) Digestion, Inductively Coupled Plasma Method ^[4]
39	Sulfide	1) Iodometric method ^[4] 2) Methylene blue method ^[4]
40	Temperature	Laboratory and Field Methods ^[4]
41	Total Dissolved Solids	Dried at 180 °C ^[4]
42	Total Kjeldahl Nitrogen	1) Macro Kjeldahl Method ^[4] 2) Semi-Micro Kjeldahl Method ^[4]
43	Total Suspended Solids	Dried at 103-105 °C ^[4]
44	Trivalent Chromium	1) Digestion, Direct Air-Acetylene Flame Method; Colorimetric Method; Calculation ^[4] 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method; Colorimetric Method; Calculation ^[4] 3) Digestion, Inductively Coupled Plasma Method; Colorimetric Method; Calculation ^[4]
45	Zinc	1) Digestion, Direct Air-Acetylene Flame Method ^[4] 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method ^[4] 3) Digestion, Inductively Coupled Plasma Method ^[4] <i>วิธี</i>

น้ำใต้ดิน...

น้ำใต้ดิน จำนวน 125 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Acenaphthene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
2	Acetone	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ^[4]
3	Aldrin	1) Liquid-Liquid Extraction, Gas Chromatographic Method ^[4] 2) Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
4	Anthracene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
5	Antimony	Digestion, Inductively Coupled Plasma Spectrometric Method ^[4]
6	Arsenic	1) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^[4] 2) Digestion, Inductively Coupled Plasma Method ^[4]
7	Atrazine	Liquid-Liquid Extraction, Gas Chromatographic Method ^[4]
8	Barium	1) Digestion, Direct Nitrous Oxide-Acetylene Flame Method ^[4] 2) Digestion, Inductively Coupled Plasma 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] 3 ม)

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
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	Digestion, Inductively Coupled Plasma Spectrometric Method ^[4]
17	Bis(2-chloroethyl)ether	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
18	Bis(2-ethylhexyl)phthalate	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
19	Bromodichloromethane	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ^[4]
20	Bromoform	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ^[4]
21	Butanol	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ^[4]
22	Butyl benzyl phthalate	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
23	Cadmium	1) Digestion, Direct Air-Acetylene Flame Method ^[4] 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method ^[4] 3) Digestion, Inductively Coupled Plasma 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] 3 ม)

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
27	Chlordane	1) Liquid-Liquid Extraction, Gas Chromatographic Method ^[4] 2) 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, Direct Air-Acetylene Flame Method ^[4] 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method ^[4] 3) Digestion, Inductively Coupled Plasma Spectrometric Method ^[4]
34	Chromium (III)	1) Digestion, Direct Air-Acetylene Flame Method; Colorimetric Method; Calculation ^[4] 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method; Colorimetric Method; Calculation ^[4] 3) Digestion, Inductively Coupled Plasma Spectrometric Method; Colorimetric Method; Calculation ^[4]
35	Chromium (VI)	1) Colorimetric Method ^[4] 2) Extraction, Air-Acetylene Flame Method ^[4]
36	Chrysene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[4] <i>สมย</i>

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
37	Cyanide	1) Distillation, Titrimetric Method ^[4] 2) Distillation, Colorimetric Method ^[4]
38	2,4-D	Liquid-Liquid Extraction, Gas Chromatographic Method ^[4]
39	DDD	1) Liquid-Liquid Extraction, Gas Chromatographic Method ^[4] 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[4]
40	DDE	1) Liquid-Liquid Extraction, Gas Chromatographic Method ^[4] 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[4]
41	DDT	1) Liquid-Liquid Extraction, Gas Chromatographic Method ^[4] 2) 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] <i>สมย</i>

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
50	1,1-Dichloroethylene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ^[4]
51	cis-1,2-Dichloroethylene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ^[4]
52	trans-1,2-Dichloroethylene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ^[4]
53	2,4-Dichlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[4]
54	1,2-Dichloropropane	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ^[4]
55	1,3-Dichloropropane	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ^[4]
56	1,3-Dichloropropene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ^[4]
57	Dieldrin	1) Liquid-Liquid Extraction, Gas Chromatographic Method ^[4] 2) 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	1) Liquid-Liquid Extraction, Gas Chromatographic Method ^[4] 2) Liquid-Liquid...

2) Liquid-Liquid...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
65	Endrin	2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[4] 1) Liquid-Liquid Extraction, Gas Chromatographic Method ^[4] 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[4]
66	Ethylbenzene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ^[4]
67	Fluoranthene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[4]
68	Fluorene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[4]
69	Heptachlor	1) Liquid-Liquid Extraction, Gas Chromatographic Method ^[4] 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[4]
70	Heptachlor epoxide	1) Liquid-Liquid Extraction, Gas Chromatographic Method ^[4] 2) 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	1) Liquid-Liquid Extraction, Gas Chromatographic Method ^[4] 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[4]
75	β-HCH	1) Liquid-Liquid Extraction, Gas Chromatographic Method ^[4] 2) Liquid-Liquid...

2) Liquid-Liquid...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
76	γ-HCH	2) Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4] 1) Liquid-Liquid Extraction, Gas Chromatographic Method ^[4] 2) 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, Direct Air-Acetylene Flame Method ^[4] 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method ^[4] 3) Digestion, Inductively Coupled Plasma Spectrometric Method ^[4]
82	Manganese	1) Digestion, Direct Air-Acetylene Flame Method ^[4] 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method ^[4] 3) Digestion, Inductively Coupled Plasma Spectrometric Method ^[4]
83	Mercury	Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ^[4]
84	Methanol	Purge and Trap Gas Chromatographic/ Mass spectrometric Method ^[4]
85	Methoxychlor	Liquid-Liquid Extraction, Gas Chromatographic Method ^[4]
86	Methyl bromide	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ^[4]

87 Methylene chloride...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
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, Direct Air-Acetylene Flame Method ^[4] 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method ^[4] 3) Digestion, Inductively Coupled Plasma 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 Method ^[4]
97	Pentachlorophenol	Liquid-Liquid Extraction, Gas Chromatographic Method ^[4]
98	pH	Electrometric method ^[4]

99 Phenanthrene...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
99	Phenanthrene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[4]
100	Phenol	1) Distillation, Chloroform Extraction Method ^[4] 2) Distillation, Direct Photometric Method ^[4] 3) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[4]
101	Pyrene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[4]
102	Selenium	1) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^[4] 2) Digestion, Inductively Coupled Plasma Method ^[4]
103	Silver	1) Digestion, Direct Air-Acetylene Flame Method ^[4] 2) Digestion, Inductively Coupled Plasma 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	TPH (C ₅ -C ₈)	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[12,25]
109	TPH (C ₈ -C ₁₆)	1) Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^[9,21] 2) Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass spectrometric Method ^[9,25]
110	TPH (C ₁₆ -C ₃₅)	1) Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^[9,21] <i>พิมพ์</i>

2) Separatory...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
		2) Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass spectrometric Method ^[9,25]
111	1,2,4-Trichlorobenzene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ^[4]
112	1,1,1-Trichloroethane	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ^[4]
113	1,1,2-Trichloroethane	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ^[4]
114	Trichloroethylene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ^[4]
115	2,4,5-Trichlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[4]
116	2,4,6-Trichlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[4]
117	1,3,5-Trimethylbenzene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ^[4]
118	Vanadium	Digestion, Inductively Coupled Plasma Spectrometric Method ^[4]
119	Vinyl acetate	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ^[4]
120	Vinyl chloride	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ^[4]
121	m-Xylene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ^[4]
122	o-Xylene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ^[4]
123	p-Xylene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ^[4]
124	Xylene (Total)	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ^[4] <i>พิมพ์</i>

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
125	Zinc	1) Digestion, Direct Air-Acetylene Flame Method ^[4] 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method ^[4] 3) Digestion, Inductively Coupled Plasma Spectrometric Method ^[4]

อากาศเสีย (ปล่อยระบาย) จำนวน 27 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Antimony	1) Isokinetic Sampling, Digestion, Direct Air-Acetylene Flame Method ^[5] 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method ^[5]
2	Arsenic	1) Isokinetic Sampling, Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^[5] 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method ^[5]
3	Beryllium	Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method ^[5]
4	Cadmium	1) Isokinetic Sampling, Digestion, Direct Air-Acetylene Flame Method ^[5] 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method ^[5]
5	Carbon monoxide	Instrumental Analyzer Method ^[5]
6	Chlorine	1) Absorption Sampling, Ion Chromatographic Method ^[5] 2) Isokinetic Sampling, Ion Chromatographic Method ^[5]
7	Chromium	1) Isokinetic Sampling, Digestion, Direct Air-Acetylene Flame Method ^[5] 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method ^[5] <i>รวม</i>

8 Cobalt...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
8	Cobalt	Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method ^[5]
9	Copper	1) Isokinetic Sampling, Digestion, Direct Air-Acetylene Flame Method ^[5] 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method ^[5]
10	Cresol	Adsorption Sampling, Gas Chromatographic Method ^[5]
11	Dioxin/Furans	Isokinetic Sampling ^[5]
12	Hydrogen chloride	1) Absorption Sampling, Ion Chromatographic Method ^[5] 2) Isokinetic Sampling, Ion Chromatographic Method ^[5]
13	Hydrogen Fluoride	1) Absorption Sampling, Ion Chromatographic Method ^[5] 2) Isokinetic Sampling, Ion Chromatographic Method ^[5]
14	Hydrogen Sulfide	Absorption Sampling, Iodometric Method ^[5]
15	Lead	1) Isokinetic Sampling, Digestion, Direct Air-Acetylene Flame Method ^[5] 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method ^[5]
16	Manganese	1) Isokinetic Sampling, Digestion, Direct Air-Acetylene Flame Method ^[5] 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method ^[5]
17	Mercury	Isokinetic Sampling, Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ^[5]
18	Nickel	1) Isokinetic Sampling, Digestion, Direct Air-Acetylene Flame Method ^[5] 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method ^[5] <i>รวม</i>

19 Opacity...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
19	Opacity	Ringelmann's Method ^[2]
20	Oxides of Nitrogen	1) Absorption Sampling, Phenoldisulfonic acid Method ^[5] 2) Absorption Sampling, Ion Chromatographic Method ^[5] 3) Instrumental Analyzer Method ^[5]
21	Selenium	1) Isokinetic Sampling, Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^[5] 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method ^[5]
22	Sulfur dioxide	1) Isokinetic Sampling, Barium-Thorin Titrimetric Method ^[5] 2) Absorption Sampling, Barium-Thorin Titrimetric Method ^[5] 3) Instrumental Analyzer Method ^[5]
23	Sulfuric acid	Isokinetic Sampling, Barium-Thorin Titrimetric Method ^[5]
24	Tin	Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method ^[5]
25	Total Suspended Particulate	1) Isokinetic Sampling, Gravimetric Method ^[5] 2) Paired Train, Isokinetic Sampling, Gravimetric Method ^[5]
26	Vanadium	Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method ^[5]
27	Xylene	1) Adsorption Sampling, Gas Chromatographic Method ^[5] 2) Adsorption Sampling, Gas Chromatographic/Mass Spectrometric Method ^[5]

สิ่งปฏิกูล...

สิ่งปฏิกูลหรือวัสดุที่ไม่ใช้แล้ว จำนวน 34 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Aldrin	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^[1,6,9,22] 2) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[1,6,9,27] 3) Soxhlet Extraction, Gas Chromatographic Method ^[10,22] 4) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[10,27]
2	Antimony	1) Waste Extraction, Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^[1,6,16] 2) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,6,14] 3) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^[7,16] 4) Digestion, Inductively Coupled Plasma Method ^[7,14]
3	Arsenic	1) Waste Extraction, Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^[1,6,16] 2) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,6,14] 3) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^[7,16] 4) Digestion, Inductively Coupled Plasma Method ^[7,14]
4	Barium	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^[1,6,15]

2) Waste Extraction...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
5	Beryllium	2) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,6,14] 3) Digestion, Flame Atomic Absorption Spectrometric Method ^[7,15] 4) Digestion, Inductively Coupled Plasma Method ^[7,14]
6	Cadmium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,6,14] 2) Digestion, Inductively Coupled Plasma Method ^[7,14]
7	Chlordane	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^[1,6,15] 2) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,6,14] 3) Digestion, Flame Atomic Absorption Spectrometric Method ^[7,15] 4) Digestion, Inductively Coupled Plasma Method ^[7,14]
8	Chromium	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^[1,9,22] 2) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[1,9,27] 3) Soxhlet Extraction, Gas Chromatographic Method ^[10,22] 4) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[10,27] 1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^[1,6,15] 2) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,6,14] <i>เพิ่ม</i>

3) Digestion...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
9	Chromium (III)	3) Digestion, Flame Atomic Absorption Spectrometric Method ^[7,15] 4) Digestion, Inductively Coupled Plasma Method ^[7,14] 1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method; Waste Extraction, Colorimetric Method; Calculation ^[1,6,15,17] 2) Waste Extraction, Digestion, Inductively Coupled Plasma Method; Waste Extraction, Colorimetric Method; Calculation ^[1,6,14,17]
10	Chromium (VI)	3) Digestion, Flame Atomic Absorption Spectrometric Method; Alkaline Digestion, Colorimetric Method; Calculation ^[7,8,15,17] 4) Digestion, Inductively Coupled Plasma Method; Alkaline Digestion, Colorimetric Method; Calculation ^[7,8,14,17]
11	Cobalt	1) Waste Extraction, Colorimetric Method ^[1,17] 2) Alkaline Digestion, Colorimetric Method ^[8,17]
12	Copper	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,6,14] 2) Digestion, Inductively Coupled Plasma Method ^[7,14] 1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^[1,6,15] 2) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,6,14] 3) Digestion, Flame Atomic Absorption Spectrometric Method ^[7,15] 4) Digestion, Inductively Coupled Plasma Method ^[7,14] <i>เพิ่ม</i>

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
13	2,4-D	1) Waste Extraction, Gas Chromatographic/Mass Spectrometric Method ^[1,25] 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^[25]
14	DDD	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^[1,9,22] 2) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[1,9,27] 3) Soxhlet Extraction, Gas Chromatographic Method ^[10,22] 4) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[10,27]
15	DDE	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^[1,9,22] 2) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[1,9,27] 3) Soxhlet Extraction, Gas Chromatographic Method ^[10,22] 4) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[10,27]
16	DDT	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^[1,9,22] 2) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[1,9,27] 3) Soxhlet Extraction, Gas Chromatographic Method ^[10,22] 4) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[10,27]

17 Dieldrin...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
17	Dieldrin	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^[1,9,22] 2) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[1,9,27] 3) Soxhlet Extraction, Gas Chromatographic Method ^[10,22] 4) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[10,27]
18	Endrin	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^[1,9,22] 2) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[1,9,27] 3) Soxhlet Extraction, Gas Chromatographic Method ^[10,22] 4) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[10,27]
19	Heptachlor	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^[1,9,22] 2) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[1,9,27] 3) Soxhlet Extraction, Gas Chromatographic Method ^[10,22] 4) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[10,27]
20	Lead	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^[1,6,15] 2) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,6,14]

3) Digestion...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
21	Lindane	3) Digestion, Flame Atomic Absorption Spectrometric Method ^[7,15] 4) Digestion, Inductively Coupled Plasma Method ^[7,14] 1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^[1,9,22] 2) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[1,9,27] 3) Soxhlet Extraction, Gas Chromatographic Method ^[10,22] 4) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[10,27]
22	Mercury	1) Waste Extraction, Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ^[1,18] 2) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,6,14] 3) Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ^[19] 4) Digestion, Inductively Coupled Plasma Method ^[7,14]
23	Methoxychlor	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^[1,9,22] 2) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[1,9,27] 3) Soxhlet Extraction, Gas Chromatographic Method ^[10,22] 4) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[10,27]


24 Molybdenum...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
24	Molybdenum	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,6,14] 2) Digestion, Inductively Coupled Plasma Method ^[7,14]
25	Nickel	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^[1,6,15] 2) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,6,14] 3) Digestion, Flame Atomic Absorption Spectrometric Method ^[7,15] 4) Digestion, Inductively Coupled Plasma Method ^[7,14]
26	Polychlorinated Biphenyls - Aroclor 1016 - Aroclor 1221 - Aroclor 1232 - Aroclor 1242 - Aroclor 1248 - Aroclor 1254 - Aroclor 1260	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^[1,9,23] 2) Soxhlet Extraction, Gas Chromatographic Method ^[10,23]
27	Pentachlorophenol	1) Waste Extraction, Gas Chromatographic/Mass Spectrometric Method ^[1,25] 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^[25]
28	pH	Electrometric Method ^[31,32]
29	Selenium	1) Waste Extraction, Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^[1,6,20] 2) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,6,14] 3) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^[7,20]


4) Digestion...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
30	Silver	4) Digestion, Inductively Coupled Plasma Method ^[7,14] 1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,6,14] 2) Digestion, Inductively Coupled Plasma Method ^[7,14]
31	Thallium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,6,14] 2) Digestion, Inductively Coupled Plasma Method ^[7,14]
32	Trichloroethylene	1) Waste Extraction, Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[1,12,26] 2) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[12,26]
33	Vanadium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,6,14] 2) Digestion, Inductively Coupled Plasma Method ^[7,14]
34	Zinc	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^[1,6,15] 2) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,6,14] 3) Digestion, Flame Atomic Absorption Spectrometric Method ^[7,15] 4) Digestion, Inductively Coupled Plasma Method ^[7,14]

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ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Acenaphthene	Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[10,27] 

2 Acetone...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
2	Acetone	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[13,26]
3	Aldrin	1) Ultrasonic Extraction, Gas Chromatographic Method ^[11,22] 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^[11,27]
4	Anthracene	Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[10,27]
5	Antimony	1) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^[7,16] 2) Digestion, Inductively Coupled Plasma Method ^[7,14]
6	Arsenic	1) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^[7,16] 2) Digestion, Inductively Coupled Plasma Method ^[7,14]
7	Atrazine	Ultrasonic Extraction, Gas Chromatographic Method ^[11,24]
8	Barium	1) Digestion, Flame Atomic Absorption Spectrometric Method ^[7,15] 2) Digestion, Inductively Coupled Plasma Method ^[7,14]
9	Benz(a)anthracene	Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[10,27]
10	Benzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[13,26]
11	Benzo(b)fluoranthene	Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[10,27]
12	Benzo(k)fluoranthene	Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[10,27]
13	Benzoic acid	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^[11,27] 

14 Benzo(a)pyrene...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
14	Benzo(a)pyrene	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[10,27]
15	Benzo(g,h,i)perylene	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[10,27]
16	Beryllium	Digestion, Inductively Coupled Plasma Method ^[7,14]
17	Bis(2-chloroethyl)ether	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[10,27]
18	Bis(2-ethylhexyl)phthalate	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[10,27]
19	Bromodichloromethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[13,26]
20	Bromoform	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[13,26]
21	Butanol	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[13,26]
22	Butyl benzyl phthalate	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[10,27]
23	Cadmium	1) Digestion, Flame Atomic Absorption Spectrometric Method ^[7,15] 2) Digestion, Inductively Coupled Plasma Method ^[7,14]
24	Carbazole	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[10,27]
25	Carbon disulfide	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[13,26]
26	Carbon tetrachloride	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[13,26]
27	Chlordane	1) Ultrasonic Extraction, Gas Chromatographic Method ^[11,22] 2) Ultrasonic Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[11,27]

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
28	p-Chloroaniline	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[10,27]
29	Chlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[13,26]
30	Chlorodibromomethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[13,26]
31	Chloroform	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[13,26]
32	2-Chlorophenol	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^[11,27]
33	Chromium	1) Digestion, Flame Atomic Absorption Spectrometric Method ^[7,15] 2) Digestion, Inductively Coupled Plasma Method ^[7,14]
34	Chromium (III)	1) Digestion, Flame Atomic Absorption Spectrometric Method; Colorimetric Method; Calculation ^[7,8,15,17] 2) Digestion, Inductively Coupled Plasma Method; Colorimetric Method; Calculation ^[7,8,14,17]
35	Chromium (VI)	Alkaline Digestion, Colorimetric Method ^[8,17]
36	Chrysene	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[10,27]
37	Cyanide	1) Extraction, Distillation, Titrimetric Method ^[28,29,30] 2) Extraction, Distillation, Colorimetric Method ^[28,29,30]
38	2,4-D	Ultrasonic Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[24]
39	DDD	1) Ultrasonic Extraction, Gas Chromatographic Method ^[11,22] 2) Ultrasonic Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[11,27]

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
40	DDE	1) Ultrasonic Extraction, Gas Chromatographic Method ^[11,22] 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^[11,27]
41	DDT	1) Ultrasonic Extraction, Gas Chromatographic Method ^[11,22] 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^[11,27]
42	Dibenz(a,h)anthracene	Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[10,27]
43	Di-n-butyl phthalate	Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[10,27]
44	1,2-Dichlorobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[13,26]
45	1,3-Dichlorobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[13,26]
46	1,4-Dichlorobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[13,26]
47	3,3'-Dichlorobenzidine	Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[10,27]
48	1,1-Dichloroethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[13,26]
49	1,2-Dichloroethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[13,26]
50	1,1-Dichloroethylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[13,26]
51	cis-1,2-Dichloroethylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[13,26]
52	trans-1,2-Dichloroethylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[13,26]
53	2,4-Dichlorophenol	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^[11,27]

54 1,2-Dichloropropane...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
54	1,2-Dichloropropane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[13,26]
55	1,3-Dichloropropane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[13,26]
56	1,3-Dichloropropene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[13,26]
57	Dieldrin	1) Ultrasonic Extraction, Gas Chromatographic Method ^[11,22] 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^[11,27]
58	Diethyl phthalate	Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[10,27]
59	2,4-Dimethylphenol	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^[11,27]
60	2,4-Dinitrophenol	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^[11,27]
61	2,4-Dinitrotoluene	Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[10,27]
62	2,6-Dinitrotoluene	Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[10,27]
63	Di-n-Octyl phthalate	Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[10,27]
64	Endosulfan	1) Ultrasonic Extraction, Gas Chromatographic Method ^[11,22] 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^[11,27]
65	Endrin	1) Ultrasonic Extraction, Gas Chromatographic Method ^[11,22] 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^[11,27]
66	Ethylbenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[13,26]

67 Fluoranthene...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
67	Fluoranthene	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[10,27]
68	Fluorene	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[10,27]
69	Heptachlor	1) Ultrasonic Extraction, Gas Chromatographic Method ^[11,22] 2) Ultrasonic Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[11,27]
70	Heptachlor epoxide	1) Ultrasonic Extraction, Gas Chromatographic Method ^[11,22] 2) Ultrasonic Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[11,27]
71	Hexachlorobenzene	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^[11,27]
72	Hexachloro-1,3-butadiene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[13,26]
73	n-Hexane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[13,26]
74	α-HCH	1) Ultrasonic Extraction, Gas Chromatographic Method ^[11,22] 2) Ultrasonic Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[11,27]
75	β-HCH	1) Ultrasonic Extraction, Gas Chromatographic Method ^[11,22] 2) Ultrasonic Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[11,27]
76	γ-HCH	1) Ultrasonic Extraction, Gas Chromatographic Method ^[11,22] 2) Ultrasonic Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[11,27]
77	Hexachlorocyclopentadiene	Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[10,27]

78 Hexachloroethane...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
78	Hexachloroethane	Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[10,27]
79	Indeno(1,2,3-cd)pyrene	Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[10,27]
80	Isophorone	Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[10,27]
81	Lead	1) Digestion, Flame Atomic Absorption Spectrometric Method ^[7,15] 2) Digestion, Inductively Coupled Plasma Method ^[7,14]
82	Manganese	1) Digestion, Flame Atomic Absorption Spectrometric Method ^[7,15] 2) Digestion, Inductively Coupled Plasma Method ^[7,14]
83	Mercury	1) Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ^[19] 2) Digestion, Inductively Coupled Plasma Method ^[7,14]
84	Methanol	Ultrasonic Extraction, Direct Aqueous Injection, Gas Chromatographic Method ^[11,21]
85	Methoxychlor	1) Ultrasonic Extraction, Gas Chromatographic Method ^[11,22] 2) Ultrasonic Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[11,27]
86	Methyl bromide	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[13,26]
87	Methylene chloride	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[13,26]
88	2-Methylphenol	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^[11,27]
89	2-Methylnaphthalene	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^[11,27]

90 Methyl tert-butyl ether...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
90	Methyl tert-butyl ether	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[13,26]
91	Naphthalene	Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[10,27]
92	Nickel	1) Digestion, Flame Atomic Absorption Spectrometric Method ^[7,15] 2) Digestion, Inductively Coupled Plasma Method ^[7,14]
93	Nitrobenzene	Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[10,27]
94	N-Nitrosodiphenylamine	Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[10,27]
95	N-Nitrosodi-n-propylamine	Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[10,27]
96	Polychlorinated Biphenyls - Aroclor 1016 - Aroclor 1221 - Aroclor 1232 - Aroclor 1242 - Aroclor 1248 - Aroclor 1254 - Aroclor 1260	Soxhlet Extraction, Gas Chromatographic Method ^[10,23]
97	Pentachlorophenol	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^[24]
98	Phenanthrene	Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[10,27]
99	Phenol	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^[11,27]
100	Pyrene	Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[10,27]
101	Selenium	1) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^[7,20]

2) Digestion...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
102	Silver	2) Digestion, Inductively Coupled Plasma Method ^[7,14] 1) Digestion, Flame Atomic Absorption Spectrometric Method ^[7,15] 2) Digestion, Inductively Coupled Plasma Method ^[7,14]
103	Styrene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[13,26]
104	1,1,2,2-Tetrachloroethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[13,26]
105	Tetrachloroethylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[13,26]
106	Toluene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[13,26]
107	TPH (C ₅ -C ₈)	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[13,26]
108	TPH (C ₈ -C ₁₆)	1) Soxhlet Extraction, Gas Chromatographic Method ^[10,21] 2) Soxhlet Extraction, Gas Chromatographic/Mass spectrometric Method ^[10,26]
109	TPH (C ₁₆ -C ₃₅)	1) Soxhlet Extraction, Gas Chromatographic Method ^[10,21] 2) Soxhlet Extraction, Gas Chromatographic/Mass spectrometric Method ^[10,26]
110	1,2,4-Trichlorobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[13,26]
111	1,1,1-Trichloroethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[13,26]
112	1,1,2-Trichloroethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[13,26]
113	Trichloroethylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[13,26]

114 2,4,5-Trichlorophenol...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
114	2,4,5-Trichlorophenol	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^[11,27]
115	2,4,6-Trichlorophenol	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^[11,27]
116	1,3,5-Trimethylbenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[13,26]
117	Vanadium	Digestion, Inductively Coupled Plasma Method ^[7,14]
118	Vinyl acetate	Purge and Trap, Gas Chromatographic/Mass spectrometric Method ^[13,26]
119	Vinyl chloride	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[13,26]
120	m-Xylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[13,26]
121	o-Xylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[13,26]
122	p-Xylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[13,26]
123	Xylene (Total)	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[13,26]
124	Zinc	1) Digestion, Flame Atomic Absorption Spectrometric Method ^[7,15] 2) Digestion, Inductively Coupled Plasma Method ^[7,14]

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ที่ อก ๐๓๑๐(๑)/ ๕ ๐ ๕๕



กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท
เขตราชเทวี กรุงเทพฯ ๑๐๔๐๐

๒๗ พฤษภาคม ๒๕๖๗

เรื่อง เปลี่ยนแปลงบุคลากรของห้องปฏิบัติการวิเคราะห์

เรียน กรรมการผู้จัดการ บริษัท ซีคอฟ จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกชน
ลงวันที่ ๒๑ พฤษภาคม ๒๕๖๗

ตามคำขอที่อ้างถึง บริษัท ซีคอฟ จำกัด ห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ว-๒๓๙
สถานที่ตั้งเลขที่ ๒๓๙ ถนนริมคลองประปา แขวงบางซื่อ เขตบางซื่อ กรุงเทพมหานคร ขอเปลี่ยนแปลงบุคลากร
ความละเอียดแจ้งแล้ว นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้ยกเลิกเจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์
จำนวน ๒ ราย ได้แก่

๑) นายวัชรกานต์ ประมาคะเต

ทะเบียนเลขที่ ว-๒๓๙-จ-๐๐๑๕

๒) นายรัตนชัย ขอบทักกิจ

ทะเบียนเลขที่ ว-๒๓๙-จ-๐๐๓๐

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ


(นายพรยศ กลิ่นกรอง)
รองอธิบดี ปฏิบัติราชการแทน
อธิบดีกรมโรงงานอุตสาหกรรม

กองวิจัยและเตือนภัยมลพิษโรงงาน

กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษและทะเบียนห้องปฏิบัติการ

โทร. ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๐๓-๕

โทรสาร ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๙๙

ไปรษณีย์อิเล็กทรอนิกส์ saraban@diw.mail.go.th

ที่ อก ๐๓๑๐(๑)/ ๑๑ ๕๕ ๗



กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท
เขตราชเทวี กรุงเทพฯ ๑๐๔๐๐

๒๑ พฤศจิกายน ๒๕๖๗

เรื่อง ยกเลิกบุคลากรของห้องปฏิบัติการวิเคราะห์

เรียน กรรมการผู้จัดการ บริษัท ซีคอฟ จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกชน
ลงวันที่ ๕ พฤศจิกายน ๒๕๖๗

ตามคำขอที่อ้างถึง บริษัท ซีคอฟ จำกัด ห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ว-๒๓๙
สถานที่ตั้งเลขที่ ๒๓๙ ถนนริมคลองประปา แขวงบางซื่อ เขตบางซื่อ กรุงเทพมหานคร ขอยกเลิกบุคลากร
ความละเอียดแจ้งแล้ว นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้ยกเลิกเจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์
จำนวน ๓ ราย ได้แก่

๑) นางสาวพัชรา สมานฉันท์

ทะเบียนเลขที่ ว-๒๓๙-จ-๐๐๒๑

๒) นางสาวสุภาวดี บัวแก้ว

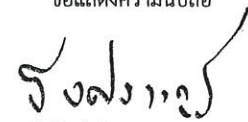
ทะเบียนเลขที่ ว-๒๓๙-จ-๐๐๓๖

๓) นางสาวมาลียามณี ฮาแว

ทะเบียนเลขที่ ว-๒๓๙-จ-๐๐๓๗

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ


(นายธีรทัศน์ อิศรางกูร ณ อยุธยา)
รองอธิบดี ปฏิบัติราชการแทน
อธิบดีกรมโรงงานอุตสาหกรรม

กองวิจัยและเตือนภัยมลพิษโรงงาน

กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษและทะเบียนห้องปฏิบัติการ

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โทรสาร ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๙๙

ไปรษณีย์อิเล็กทรอนิกส์ saraban@diw.mail.go.th





แบบ กษช./สมอ.๒
Form NSC/TISI 2

ใบรับรองเลขที่ 24-LB0026
(Certificate No.)

ใบรับรองระบบงาน (Certificate of Accreditation)

อาศัยอำนาจตามความในพระราชบัญญัติการมาตรฐานแห่งชาติ พ.ศ. ๒๕๕๑
(By Virtue of National Standardization Act B.E. 2551 (2008))

เลขาธิการสำนักงานมาตรฐานผลิตภัณฑ์อุตสาหกรรม
(Secretary-General, Thai Industrial Standards Institute)

ออกใบรับรองฉบับนี้ให้
(Issues this certificate to)

บริษัท ซีคोट จำกัด ฝ่ายห้องปฏิบัติการทดสอบด้านสิ่งแวดล้อม
(Secot Company Limited, Environmental Laboratory Division)

ตั้งอยู่เลขที่
(Address)

๒๓๙ ถนนริมคลองประปา แขวงบางซื่อ เขตบางซื่อ กรุงเทพมหานคร
(239 Rimklongsrapa Road, Bangsue, Bangkok)

ได้รับการรับรองความสามารถ
(Certificate of competence)

ตามมาตรฐานเลขที่ มอก. ๑๗๐๒๕ - ๒๕๖๑
(Standard No. TIS 17025-2561 (2018) (ISO/IEC 17025: 2017))

ข้อกำหนดทั่วไปว่าด้วยความสามารถของ ห้องปฏิบัติการทดสอบและห้องปฏิบัติการสอบเทียบ
(General requirements for the competence of testing and calibration laboratories)

หมายเลขการรับรองที่ ทดสอบ ๐๓๙๔
(Accreditation No. Testing 0394)

โดยมีรายละเอียดสาขาและขอบข่ายที่ใบรับรอง แสดงไว้ใน QR CODE และ www.tisi.go.th
(Details of the scheme and scope of the certificate are shown in QR CODE and www.tisi.go.th)

ออกให้ ณ วันที่ ๖ ธันวาคม พ.ศ. ๒๕๖๖
(Issue date : 6 December B.E. 2566 (2023))


(นายวีระศักดิ์ เพ็งหล่ง)
(Mr. Virasakdi Penglong)

ผู้อำนวยการสำนักงานคณะกรรมการการมาตรฐานแห่งชาติ
ปฏิบัติราชการแทน
เลขาธิการสำนักงานมาตรฐานผลิตภัณฑ์อุตสาหกรรม



Signed by สำนักงานมาตรฐานผลิตภัณฑ์อุตสาหกรรม (มอก.)
Thai Industrial Standards Institute (TISI)
Date: 2023-12-06T08:49:04.476+07:00
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กระทรวงอุตสาหกรรม สำนักงานมาตรฐานผลิตภัณฑ์อุตสาหกรรม
(Ministry of Industry Thailand, Thai Industrial Standards Institute)



รายละเอียดสาขาและขอบข่ายใบรับรองห้องปฏิบัติการ
(Scope of Accreditation for Testing)

ใบรับรองเลขที่ 24-LB0026
(Certification No. 24-LB0026)



ชื่อห้องปฏิบัติการ
(Laboratory Name)

บริษัท ซีคोट จำกัด ฝ่ายห้องปฏิบัติการทดสอบด้านสิ่งแวดล้อม
(Secot Company Limited, Environmental Laboratory Division)

หมายเลขการรับรองที่
(Accreditation No.)

ทดสอบ 0394
(Testing 0394)

ฉบับที่ 02
(Issue No.02)

ออกให้ตั้งแต่วันที่ 30 ตุลาคม พ.ศ. 2566
(Valid from) (30 October B.E.2566 (2023))

สถานภาพห้องปฏิบัติการ
(Laboratory status)

☒ ถาวร
(Permanent)

☐ นอกสถานที่
(Site)

☐ชั่วคราว
(Temporary)

☐เคลื่อนที่
(Mobile)

☐หลายสถานที่
(Multisite)

สาขาการทดสอบ (Field of Testing)	รายการทดสอบ (Parameter)	วิธีทดสอบ (Test Method)
สาขาสังแวดล้อม (environmental field) 1. น้ำและน้ำเสีย (water and wastewater)	- โลหะหนัก (heavy metals) • สารหนู (Arsenic, As) 0.000 5 mg/L ถึง 0.090 0 mg/L • สารหนู (Arsenic, As) 0.05 mg/L ถึง 4.50 mg/L • แบเรียม (Barium, Ba) 0.02 mg/L ถึง 4.50 mg/L • แคดเมียม (Cadmium, Cd) 0.01 mg/L ถึง 4.50 mg/L • โครเมียม (Chromium, Cr) 0.01 mg/L ถึง 4.50 mg/L	- Standard Methods for the Examination of Water and Wastewater, APHA , AWWA, WEF, 23 rd edition , 2017, Part 3030 F and Part 3114 C - Standard Methods for the Examination of Water and Wastewater, APHA , AWWA, WEF, 23 rd edition , 2017, Part 3030 E and Part 3120 B

กระทรวงอุตสาหกรรมสำนักงานมาตรฐานผลิตภัณฑ์อุตสาหกรรม
(Ministry of Industry, Thai Industrial Standards Institute)

หน้า 1/9

รายละเอียดสาขาและขอบข่ายใบรับรองห้องปฏิบัติการ

(Scope of Accreditation for Testing)

ใบรับรองเลขที่ 24-LB0026

(Certification No. 24-LB0026)



ฉบับที่ 02
(Issue No.02)

ออกให้ตั้งแต่วันที่ 30 ตุลาคม พ.ศ. 2566
(Valid from) (30 October B.E.2566 (2023))

ถึงวันที่ 8 กันยายน พ.ศ. 2571
(Until) (8 September B.E.2571 (2028))

สถานภาพห้องปฏิบัติการ
(Laboratory status)

☒ถาวร
(Permanent)

☐นอกสถานที่
(Site)

☐ชั่วคราว
(Temporary)

☐เคลื่อนที่
(Mobile)

☐หลายสถานที่
(Multisite)

สาขาการทดสอบ (Field of Testing)	รายการทดสอบ (Parameter)	วิธีทดสอบ (Test Method)
<p>สาขาส่งแวดล้อม (environmental field)</p> <p>1. น้ำและน้ำเสีย (ต่อ) (water and wastewater) (cont.)</p>	<p>- โลหหนัก (heavy metals)</p> <ul style="list-style-type: none"> ทองแดง (Copper, Cu) 0.02 mg/L ถึง 4.50 mg/L เหล็ก (Iron, Fe) 0.05 mg/L ถึง 9.00 mg/L ตะกั่ว (Lead, Pb) 0.03 mg/L ถึง 4.50 mg/L แมงกานีส (Manganese, Mn) 0.01 mg/L ถึง 9.00 mg/L นิกเกิล (Nickel, Ni) 0.01 mg/L ถึง 4.50 mg/L สังกะสี (Zinc, Zn) 0.02 mg/L ถึง 9.00 mg/L 	<p>- Standard Methods for the Examination of Water and Wastewater, APHA, AWWA, WEF, 23rd edition, 2017, Part 3030 E and Part 3120 B</p>

รายละเอียดสาขาและขอบข่ายใบรับรองห้องปฏิบัติการ

(Scope of Accreditation for Testing)

ใบรับรองเลขที่ 24-LB0026

(Certification No. 24-LB0026)



ฉบับที่ 02
(Issue No.02)

ออกให้ตั้งแต่วันที่ 30 ตุลาคม พ.ศ. 2566
(Valid from) (30 October B.E.2566 (2023))

ถึงวันที่ 8 กันยายน พ.ศ. 2571
(Until) (8 September B.E.2571 (2028))

สถานภาพห้องปฏิบัติการ
(Laboratory status)

☒ถาวร
(Permanent)

☐นอกสถานที่
(Site)

☐ชั่วคราว
(Temporary)

☐เคลื่อนที่
(Mobile)

☐หลายสถานที่
(Multisite)

สาขาการทดสอบ (Field of Testing)	รายการทดสอบ (Parameter)	วิธีทดสอบ (Test Method)
<p>สาขาส่งแวดล้อม (environmental field)</p> <p>1. น้ำและน้ำเสีย (ต่อ) (water and wastewater) (cont.)</p>	<p>- ซีโอดี (Chemical oxygen demand, COD) 100 mg/L ถึง 4 000 mg/L</p>	<p>- Standard Methods for the Examination of Water and Wastewater, APHA, AWWA, WEF, 23rd edition, 2017, Part 5220 D</p>
<p>2. บริเวณทำงาน (workplace)</p>	<p>- ฝุ่นละอองรวม (Total dust) 0.10 mg/filter ถึง 2.00 mg/filter</p> <p>- ฝุ่นละอองขนาดเล็ก (Respirable dust) 0.10 mg/filter ถึง 2.00 mg/filter</p>	<p>- NIOSH Manual of Analytical Methods (NMAM), method 0500, 4th edition, 15th August 1994 (Exclude Sampling)</p> <p>- NIOSH Manual of Analytical Methods (NMAM), method 0600, 4th edition, 15th January 1998 (Exclude Sampling)</p>

รายละเอียดสาขาและขอบข่ายใบรับรองห้องปฏิบัติการ

(Scope of Accreditation for Testing)

ใบรับรองเลขที่ 24-LB0026

(Certification No. 24-LB0026)



ฉบับที่ 02
(Issue No.02)

ออกให้ตั้งแต่วันที่ 30 ตุลาคม พ.ศ. 2566
(Valid from)
(30 October B.E.2566 (2023))

ถึงวันที่ 8 กันยายน พ.ศ. 2571
(Until) (8 September B.E.2571 (2028))

สถานภาพห้องปฏิบัติการ
(Laboratory status)

☒ ถาวร
(Permanent)

☐ นอกสถานที่
(Site)

☐ชั่วคราว
(Temporary)

☐เคลื่อนที่
(Mobile)

☐หลายสถานที่
(Multisite)

สาขาการทดสอบ (Field of Testing)	รายการทดสอบ (Parameter)	วิธีทดสอบ (Test Method)
<p>สาขาสิ่งแวดล้อม (environmental field)</p> <p>2. บริเวณทำงาน (ต่อ) (workplace) (cont.)</p>	<ul style="list-style-type: none"> เบนซีน (Benzene) 1.10 µg/tube ถึง 420 µg/tube โทลูอีน (Toluene) 1.10 µg/tube ถึง 420 µg/tube โทโครไซลีน (Total xylenes) 2.20 µg/tube ถึง 840 µg/tube เมตา, พารา-ไซลีน (m, p- Xylene) 1.10 µg/tube ถึง 420 µg/tube ออร์โธ-ไซลีน (o- Xylene) 1.10 µg/tube ถึง 420 µg/tube 	<ul style="list-style-type: none"> NIOSH Manual of Analytical Methods (NMAM), method 1501, 4th edition, 15th March 2003 (Exclude Sampling)
<p>3. ปล่องระบายอากาศ (stack)</p>	<ul style="list-style-type: none"> ซัลเฟอร์ไดออกไซด์ (Sulfur dioxide) 1.00 mg/L ถึง 16 000 mg/L (solution) 	<ul style="list-style-type: none"> US.EPA, Code of Federal Regulations, 40 CFR 60 appendix A, method 6, July 2019 (Exclude Sampling)

รายละเอียดสาขาและขอบข่ายใบรับรองห้องปฏิบัติการ

(Scope of Accreditation for Testing)

ใบรับรองเลขที่ 24-LB0026

(Certification No. 24-LB0026)



ฉบับที่ 02
(Issue No.02)

ออกให้ตั้งแต่วันที่ 30 ตุลาคม พ.ศ. 2566
(Valid from)
(30 October B.E.2566 (2023))

ถึงวันที่ 8 กันยายน พ.ศ. 2571
(Until) (8 September B.E.2571 (2028))

สถานภาพห้องปฏิบัติการ
(Laboratory status)

☒ ถาวร
(Permanent)

☐นอกสถานที่
(Site)

☐ชั่วคราว
(Temporary)

☐เคลื่อนที่
(Mobile)


☐หลายสถานที่
(Multisite)

สาขาการทดสอบ (Field of Testing)	รายการทดสอบ (Parameter)	วิธีทดสอบ (Test Method)
<p>สาขาสิ่งแวดล้อม (environmental field)</p> <p>3. ปล่องระบายอากาศ (ต่อ) (stack) (cont.)</p>	<ul style="list-style-type: none"> ไฮโดรเจนฟลูออไรด์ (Hydrogen fluoride) 5 µg/sample ถึง 400 µg/sample ไฮโดรเจนคลอไรด์ (Hydrogen chloride) 5 µg/sample ถึง 400 µg/sample 	<ul style="list-style-type: none"> WI-7.2-1-22 based on US.EPA, Code of Federal Regulations, 40 CFR 60 appendix A, method 26, 2019 (Exclude Sampling)

รายละเอียดสาขาและขอบข่ายใบรับรองห้องปฏิบัติการ
(Scope of Accreditation for Testing)
ใบรับรองเลขที่ 24-LB0026
(Certification No. 24-LB0026)




ฉบับที่ 02 (Issue No.02) ออกให้ตั้งแต่วันที่ 30 ตุลาคม พ.ศ. 2566 (Valid from) (30 October B.E.2566 (2023)) ถึงวันที่ 8 กันยายน พ.ศ. 2571 (Until) (8 September B.E.2571 (2028))
สถานภาพห้องปฏิบัติการ ☒ถาวร (Permanent) ☒นอกสถานที่ (Site) ☐ชั่วคราว (Temporary) ☐เคลื่อนที่ (Mobile) ☐หลายสถานที่ (Multisite)

สาขาการทดสอบ (Field of Testing)	รายการทดสอบ (Parameter)	วิธีทดสอบ (Test Method)
สาขาสิ่งแวดล้อม (environmental field) 4. บรรยากาศทั่วไป (ambient air)	<ul style="list-style-type: none"> สารอินทรีย์ระเหยง่าย (Volatile organic compounds, VOCs) คลอโรอีthin (Chloroethene) 0.05 $\mu\text{g}/\text{m}^3$ ถึง 51.00 $\mu\text{g}/\text{m}^3$ (0.02 ppbv ถึง 20.00 ppbv) 1,3-บิวทาไดเอน (1,3-butadiene) 0.04 $\mu\text{g}/\text{m}^3$ ถึง 44.00 $\mu\text{g}/\text{m}^3$ (0.02 ppbv ถึง 20.00 ppbv) โบรมอมีเทน (Bromomethane) 0.08 $\mu\text{g}/\text{m}^3$ ถึง 77.00 $\mu\text{g}/\text{m}^3$ (0.02 ppbv ถึง 20.00 ppbv) อะครอลีน (Acrolein) 0.05 $\mu\text{g}/\text{m}^3$ ถึง 45.00 $\mu\text{g}/\text{m}^3$ (0.02 ppbv ถึง 20.00 ppbv) 	WI-7.2-1-24 based on US EPA , Compendium Method TO-15 , EPA/625/R-96/010b, Second edition, January 1999 

รายละเอียดสาขาและขอบข่ายใบรับรองห้องปฏิบัติการ
(Scope of Accreditation for Testing)
ใบรับรองเลขที่ 24-LB0026
(Certification No. 24-LB0026)



ฉบับที่ 02 (Issue No.02) ออกให้ตั้งแต่วันที่ 30 ตุลาคม พ.ศ. 2566 (Valid from) (30 October B.E.2566 (2023)) ถึงวันที่ 8 กันยายน พ.ศ. 2571 (Until) (8 September B.E.2571 (2028))
สถานภาพห้องปฏิบัติการ ☒ถาวร (Permanent) ☒นอกสถานที่ (Site) ☐ชั่วคราว (Temporary) ☐เคลื่อนที่ (Mobile) ☐หลายสถานที่ (Multisite)

สาขาการทดสอบ (Field of Testing)	รายการทดสอบ (Parameter)	วิธีทดสอบ (Test Method)
สาขาสิ่งแวดล้อม (environmental field) 4. บรรยากาศทั่วไป (ต่อ) (ambient air) (cont.)	<ul style="list-style-type: none"> สารอินทรีย์ระเหยง่าย (Volatile organic compounds, VOCs) อะคริโลไนไทรล์ (Acrylonitrile) 0.04 $\mu\text{g}/\text{m}^3$ ถึง 43.00 $\mu\text{g}/\text{m}^3$ (0.02 ppbv ถึง 20.00 ppbv) ไดคลอโรมีเทน (Dichloromethane) 0.14 $\mu\text{g}/\text{m}^3$ to 69.00 $\mu\text{g}/\text{m}^3$ (0.04 ppbv ถึง 20.00 ppbv) คาร์บอนไดซัลไฟด์ (Carbon disulfide) 0.06 $\mu\text{g}/\text{m}^3$ ถึง 62.00 $\mu\text{g}/\text{m}^3$ (0.02 ppbv ถึง 20.00 ppbv) ไตรคลอโรมีเทน (Trichloromethane) 0.20 $\mu\text{g}/\text{m}^3$ ถึง 97.00 $\mu\text{g}/\text{m}^3$ (0.04 ppbv ถึง 20.00 ppbv) 1,2-ไดคลอโรอีเทน (1,2-dichloroethane) 0.08 $\mu\text{g}/\text{m}^3$ ถึง 80.00 $\mu\text{g}/\text{m}^3$ (0.02 ppbv ถึง 20.00 ppbv) 	WI-7.2-1-24 based on US EPA , Compendium Method TO-15 , EPA/625/R-96/010b, Second edition, January 1999 

รายละเอียดสาขาและขอบข่ายใบรับรองห้องปฏิบัติการ
(Scope of Accreditation for Testing)

ใบรับรองเลขที่ 24-LB0026
(Certification No. 24-LB0026)



ฉบับที่ 02
(Issue No.02)

ออกให้ตั้งแต่วันที่ 30 ตุลาคม พ.ศ. 2566
(Valid from) (30 October B.E.2566 (2023))

ถึงวันที่ 8 กันยายน พ.ศ. 2571
(Until) (8 September B.E.2571 (2028))

สถานภาพห้องปฏิบัติการ
(Laboratory status)

☒ถาวร
(Permanent)

☒นอกสถานที่
(Site)

☐ชั่วคราว
(Temporary)

☐เคลื่อนที่
(Mobile)

☐หลายสถานที่
(Multisite)

สาขาการทดสอบ (Field of Testing)	รายการทดสอบ (Parameter)	วิธีทดสอบ (Test Method)
<p>สาขาส่งแวดล้อม (environmental field)</p> <p>4. บรรยากาศทั่วไป (ต่อ) (ambient air) (cont.)</p>	<ul style="list-style-type: none"> - สารอินทรีย์ระเหยง่าย (Volatile organic compounds, VOCs) • เบนซีน (Benzene) 0.06 $\mu\text{g}/\text{m}^3$ ถึง 63.00 $\mu\text{g}/\text{m}^3$ (0.02 ppbv ถึง 20.00 ppbv) • คาร์บอนเตตระคลอไรด์ (Carbon tetrachloride) 0.25 $\mu\text{g}/\text{m}^3$ ถึง 125 $\mu\text{g}/\text{m}^3$ (0.04 ppbv ถึง 20.00 ppbv) • ไตรคลอโรเอทิลีน (Trichloroethylene) 0.21 $\mu\text{g}/\text{m}^3$ ถึง 107 $\mu\text{g}/\text{m}^3$ (0.04 ppbv ถึง 20.00 ppbv) • 1,2-ไดคลอโรโพรเพน (1,2-dichloropropane) 0.18 $\mu\text{g}/\text{m}^3$ ถึง 92.00 $\mu\text{g}/\text{m}^3$ (0.04 ppbv ถึง 20.00 ppbv) • เตตระคลอโรเอทิลีน (Tetrachloroethylene) 0.27 $\mu\text{g}/\text{m}^3$ ถึง 135 $\mu\text{g}/\text{m}^3$ (0.04 ppbv ถึง 20.00 ppbv) 	<p>- WI-7.2-1-24 based on US EPA , Compendium Method TO-15 , EPA/625/R-96/010b, Second edition, January 1999</p>

รายละเอียดสาขาและขอบข่ายใบรับรองห้องปฏิบัติการ
(Scope of Accreditation for Testing)

ใบรับรองเลขที่ 24-LB0026
(Certification No. 24-LB0026)



ฉบับที่ 02
(Issue No.02)

ออกให้ตั้งแต่วันที่ 30 ตุลาคม พ.ศ. 2566
(Valid from) (30 October B.E.2566 (2023))

ถึงวันที่ 8 กันยายน พ.ศ. 2571
(Until) (8 September B.E.2571 (2028))

สถานภาพห้องปฏิบัติการ
(Laboratory status)

☒ถาวร
(Permanent)

☒นอกสถานที่
(Site)

☐ชั่วคราว
(Temporary)

☐เคลื่อนที่
(Mobile)

☐หลายสถานที่
(Multisite)

สาขาการทดสอบ (Field of Testing)	รายการทดสอบ (Parameter)	วิธีทดสอบ (Test Method)
<p>สาขาส่งแวดล้อม (environmental field)</p> <p>4. บรรยากาศทั่วไป (ต่อ) (ambient air) (cont.)</p>	<ul style="list-style-type: none"> - สารอินทรีย์ระเหยง่าย (Volatile organic compounds ,VOCs) • 1,2-ไดโบรมโอเทน (1,2-dibromoethane) 0.31 $\mu\text{g}/\text{m}^3$ ถึง 153 $\mu\text{g}/\text{m}^3$ (0.04 ppbv ถึง 20.00 ppbv) • 1,1,2,2-เตตระคลอโรเอเทน (1,1,2,2-tetrachloroethane) 0.69 $\mu\text{g}/\text{m}^3$ ถึง 137 $\mu\text{g}/\text{m}^3$ (0.10 ppbv ถึง 20.00 ppbv) • เบนซิลคลอไรด์ (Benzyl chloride) 0.52 $\mu\text{g}/\text{m}^3$ ถึง 103 $\mu\text{g}/\text{m}^3$ (0.10 ppbv ถึง 20.00 ppbv) • 1,4-ไดคลอโรเบนซีน (1,4-dichlorobenzene) 0.24 $\mu\text{g}/\text{m}^3$ ถึง 120 $\mu\text{g}/\text{m}^3$ (0.04 ppbv ถึง 20.00 ppbv) 	<p>- WI-7.2-1-24 based on US EPA , Compendium Method TO-15 , EPA/625/R-96/010b, Second edition, January 1999</p>

ภาคผนวก ช

ใบรับรองความสามารถห้องปฏิบัติการและขอบข่ายการรับรอง
ห้องปฏิบัติการทดสอบ ตามมาตรฐาน ISO/IEC 17025
จากสำนักงานมาตรฐานอุตสาหกรรม (สมอ.)



แบบ กมช./สมอ.๒
Form NSC/TISI 2

ใบรับรองเลขที่ 24-LB0026
(Certificate No.)

ใบรับรองระบบงาน

(Certificate of Accreditation)

อาศัยอำนาจตามความในพระราชบัญญัติการมาตรฐานแห่งชาติ พ.ศ. ๒๕๕๑
(By Virtue of National Standardization Act B.E. 2551 (2008))

เลขาธิการสำนักงานมาตรฐานผลิตภัณฑ์อุตสาหกรรม
(Secretary-General, Thai Industrial Standards Institute)

ออกใบรับรองฉบับนี้ให้
(Issues this certificate to)

บริษัท ซีคอต จำกัด ฝ่ายห้องปฏิบัติการทดสอบด้านสิ่งแวดล้อม
(Secot Company Limited, Environmental Laboratory Division)

ตั้งอยู่เลขที่
(Address)

๒๓๙ ถนนริมคลองประปา แขวงบางซื่อ เขตบางซื่อ กรุงเทพมหานคร
(239 Rimklongprapa Road, Bangsue, Bangkok)

ได้รับการรับรองความสามารถ
(Certificate of competence)

ตามมาตรฐานเลขที่ มอก. ๑๗๐๒๕ - ๒๕๖๑
(Standard No. TIS 17025-2561 (2018) (ISO/IEC 17025: 2017))

ข้อกำหนดทั่วไปว่าด้วยความสามารถของ ห้องปฏิบัติการทดสอบและห้องปฏิบัติการสอบเทียบ
(General requirements for the competence of testing and calibration laboratories)

หมายเลขการรับรองที่ ทดสอบ ๐๓๙๔
(Accreditation No. Testing 0394)

โดยมีรายละเอียดสาขาและขอบข่ายที่ใบรับรอง แสดงไว้ใน QR CODE และ www.tisi.go.th
(Details of the scheme and scope of the certificate are shown in QR CODE and www.tisi.go.th)

ออกให้ ณ วันที่ ๖ ธันวาคม พ.ศ. ๒๕๖๖
(Issue date : 6 December B.E. 2566 (2023))

(นายวีระศักดิ์ เพ็งหล่ง)
ผู้อำนวยการสำนักงานคณะกรรมการการมาตรฐานแห่งชาติ
ปฏิบัติราชการแทน

เลขาธิการสำนักงานมาตรฐานผลิตภัณฑ์อุตสาหกรรม



Signed by สำนักงานมาตรฐานผลิตภัณฑ์อุตสาหกรรม (สมอ.)
Thai Industrial Standards Institute (TISI)
Date: 2023-12-06T08:49:04.476+07:00

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กระทรวงอุตสาหกรรม สำนักงานมาตรฐานผลิตภัณฑ์อุตสาหกรรม
(Ministry of Industry Thailand, Thai Industrial Standards Institute)



รายละเอียดสาขาและขอบข่ายใบรับรองห้องปฏิบัติการ
(Scope of Accreditation for Testing)
ใบรับรองเลขที่ 24-LB0026
(Certification No. 24-LB0026)



ชื่อห้องปฏิบัติการ
(Laboratory Name)

บริษัท ซีคอต จำกัด ฝ่ายห้องปฏิบัติการทดสอบด้านสิ่งแวดล้อม
(Secot Company Limited, Environmental Laboratory Division)

หมายเลขการรับรองที่
(Accreditation No.)

ทดสอบ 0394
(Testing 0394)

ฉบับที่ 02
(Issue No.02)

ออกให้ตั้งแต่วันที่ 30 ตุลาคม พ.ศ. 2566
(Valid from) (30 October B.E.2566 (2023))

ถึงวันที่ 8 กันยายน พ.ศ. 2571
(Until) (8 September B.E.2571 (2028))

สถานภาพห้องปฏิบัติการ
(Laboratory status)

☒ถาวร (Permanent) ☐นอกสถานที่ (Site) ☐ชั่วคราว (Temporary) ☐เคลื่อนที่ (Mobile) ☐หลายสถานที่ (Multisite)

สาขาการทดสอบ (Field of Testing)	รายการทดสอบ (Parameter)	วิธีทดสอบ (Test Method)
สาขาสังแวดล้อม (environmental field) 1. น้ำและน้ำเสีย (water and wastewater)	- โลหะหนัก (heavy metals) • สารหนู (Arsenic, As) 0.000 5 mg/L ถึง 0.090 0 mg/L • สารหนู (Arsenic, As) 0.05 mg/L ถึง 4.50 mg/L • แบเรียม (Barium, Ba) 0.02 mg/L ถึง 4.50 mg/L • แคดเมียม (Cadmium, Cd) 0.01 mg/L ถึง 4.50 mg/L • โครเมียม (Chromium, Cr) 0.01 mg/L ถึง 4.50 mg/L	- Standard Methods for the Examination of Water and Wastewater, APHA, AWWA, WEF, 23 rd edition, 2017, Part 3030 F and Part 3114 C - Standard Methods for the Examination of Water and Wastewater, APHA, AWWA, WEF, 23 rd edition, 2017, Part 3030 E and Part 3120 B

กระทรวงอุตสาหกรรม สำนักงานมาตรฐานผลิตภัณฑ์อุตสาหกรรม
(Ministry of Industry, Thai Industrial Standards Institute)

รายละเอียดสาขาและขอบข่ายใบรับรองห้องปฏิบัติการ

(Scope of Accreditation for Testing)

ใบรับรองเลขที่ 24-LB0026

(Certification No. 24-LB0026)



ฉบับที่ 02
(Issue No.02)

ออกให้ตั้งแต่วันที่ 30 ตุลาคม พ.ศ. 2566
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ถึงวันที่ 8 กันยายน พ.ศ. 2571
(Until) (8 September B.E.2571 (2028))

สถานภาพห้องปฏิบัติการ
(Laboratory status)

☒ถาวร
(Permanent)

☐นอกสถานที่
(Site)

☐ชั่วคราว
(Temporary)

☐เคลื่อนที่
(Mobile)

☐หลายสถานที่
(Multisite)

สาขาการทดสอบ (Field of Testing)	รายการทดสอบ (Parameter)	วิธีทดสอบ (Test Method)
<p>สาขาสสิ่งแวดล้อม (environmental field)</p> <p>1. น้ำและน้ำเสีย (ต่อ) (water and wastewater) (cont.)</p>	<p>- โลหะหนัก (heavy metals)</p> <ul style="list-style-type: none"> ทองแดง (Copper, Cu) 0.02 mg/L ถึง 4.50 mg/L เหล็ก (Iron, Fe) 0.05 mg/L ถึง 9.00 mg/L ตะกั่ว (Lead, Pb) 0.03 mg/L ถึง 4.50 mg/L แมงกานีส (Manganese, Mn) 0.01 mg/L ถึง 9.00 mg/L นิกเกิล (Nickel, Ni) 0.01 mg/L ถึง 4.50 mg/L สังกะสี (Zinc, Zn) 0.02 mg/L ถึง 9.00 mg/L 	<p>- Standard Methods for the Examination of Water and Wastewater, APHA , AWWA, WEF, 23rd edition , 2017, Part 3030 E and Part 3120 B</p>

รายละเอียดสาขาและขอบข่ายใบรับรองห้องปฏิบัติการ

(Scope of Accreditation for Testing)

ใบรับรองเลขที่ 24-LB0026

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ฉบับที่ 02
(Issue No.02)

ออกให้ตั้งแต่วันที่ 30 ตุลาคม พ.ศ. 2566
(Valid from) (30 October B.E.2566 (2023))

ถึงวันที่ 8 กันยายน พ.ศ. 2571
(Until) (8 September B.E.2571 (2028))

สถานภาพห้องปฏิบัติการ
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(Multisite)

สาขาการทดสอบ (Field of Testing)	รายการทดสอบ (Parameter)	วิธีทดสอบ (Test Method)
<p>สาขาสสิ่งแวดล้อม (environmental field)</p> <p>1. น้ำและน้ำเสีย (ต่อ) (water and wastewater) (cont.)</p> <p>2. บริเวณทำงาน (workplace)</p>	<p>- ซีโอดี (Chemical oxygen demand, COD) 100 mg/L ถึง 4 000 mg/L</p> <p>- ฝุ่นละอองรวม (Total dust) 0.10 mg/filter ถึง 2.00 mg/filter</p> <p>- ฝุ่นละอองขนาดเล็ก (Respirable dust) 0.10 mg/filter ถึง 2.00 mg/filter</p>	<p>- Standard Methods for the Examination of Water and Wastewater, APHA, AWWA, WEF, 23rd edition , 2017, Part 5220 D</p> <p>- NIOSH Manual of Analytical Methods (NMAM) , method 0500, 4th edition , 15th August 1994 (Exclude Sampling)</p> <p>- NIOSH Manual of Analytical Methods (NMAM) , method 0600, 4th edition , 15th January 1998 (Exclude Sampling)</p>

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ฉบับที่ 02
(Issue No.02)

ออกให้ตั้งแต่วันที่ 30 ตุลาคม พ.ศ. 2566
(Valid from) (30 October B.E.2566 (2023))

ถึงวันที่ 8 กันยายน พ.ศ. 2571
(Until) (8 September B.E.2571 (2028))

สถานภาพห้องปฏิบัติการ
(Laboratory status)

☒ถาวร
(Permanent)

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(Site)

☐ชั่วคราว
(Temporary)

☐เคลื่อนที่
(Mobile)

☐หลายสถานที่
(Multisite)

สาขาการทดสอบ (Field of Testing)	รายการทดสอบ (Parameter)	วิธีทดสอบ (Test Method)
<p>สาขาสังแวดล้อม (environmental field)</p> <p>2. บริเวณทำงาน (ต่อ) (workplace) (cont.)</p>	<ul style="list-style-type: none"> เบนซีน (Benzene) 1.10 µg/tube ถึง 420 µg/tube โทลูอีน (Toluene) 1.10 µg/tube ถึง 420 µg/tube โทไทรไซลีน (Total xylenes) 2.20 µg/tube ถึง 840 µg/tube เมตา, พารา-ไซลีน (m, p- Xylene) 1.10 µg/tube ถึง 420 µg/tube ออร์โธ-ไซลีน (o- Xylene) 1.10 µg/tube ถึง 420 µg/tube 	<ul style="list-style-type: none"> NIOSH Manual of Analytical Methods (NMAM) , method 1501, 4th edition , 15th March 2003 (Exclude Sampling)
<p>3. ปล่องระบายอากาศ (stack)</p>	<ul style="list-style-type: none"> ซัลเฟอร์ไดออกไซด์ (Sulfur dioxide) 1.00 mg/L ถึง 16 000 mg/L (solution) 	<ul style="list-style-type: none"> US.EPA , Code of Federal Regulations , 40 CFR 60 appendix A , method 6 , July 2019 (Exclude Sampling)

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สาขาการทดสอบ (Field of Testing)	รายการทดสอบ (Parameter)	วิธีทดสอบ (Test Method)
<p>สาขาสังแวดล้อม (environmental field)</p> <p>3. ปล่องระบายอากาศ (ต่อ) (stack) (cont.)</p>	<ul style="list-style-type: none"> ไฮโดรเจนฟลูออไรด์ (Hydrogen fluoride) 5 µg/sample ถึง 400 µg/sample ไฮโดรเจนคลอไรด์ (Hydrogen chloride) 5 µg/sample ถึง 400 µg/sample 	<ul style="list-style-type: none"> WI-7.2-1-22 based on US.EPA , Code of Federal Regulations , 40 CFR 60 appendix A, method 26 , 2019 (Exclude Sampling)

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สาขาการทดสอบ (Field of Testing)	รายการทดสอบ (Parameter)	วิธีทดสอบ (Test Method)
<p>สาขาสสิ่งแวดล้อม (environmental field)</p> <p>4. บรรยากาศทั่วไป (ambient air)</p>	<p>- สารอินทรีย์ระเหยง่าย (Volatile organic compounds, VOCs)</p> <ul style="list-style-type: none"> คลอโรอีthin (Chloroethene) 0.05 $\mu\text{g}/\text{m}^3$ ถึง 51.00 $\mu\text{g}/\text{m}^3$ (0.02 ppbv ถึง 20.00 ppbv) 1,3-บิวทาไดเีน (1,3-butadiene) 0.04 $\mu\text{g}/\text{m}^3$ ถึง 44.00 $\mu\text{g}/\text{m}^3$ (0.02 ppbv ถึง 20.00 ppbv) โบรมอมีเทน (Bromomethane) 0.08 $\mu\text{g}/\text{m}^3$ ถึง 77.00 $\mu\text{g}/\text{m}^3$ (0.02 ppbv ถึง 20.00 ppbv) อะคลอลีน (Acrolein) 0.05 $\mu\text{g}/\text{m}^3$ ถึง 45.00 $\mu\text{g}/\text{m}^3$ (0.02 ppbv ถึง 20.00 ppbv) 	<p>- WI-7.2-1-24 based on US EPA , Compendium Method TO-15 , EPA/625/R-96/010b, Second edition, January 1999</p>

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สาขาการทดสอบ (Field of Testing)	รายการทดสอบ (Parameter)	วิธีทดสอบ (Test Method)
<p>สาขาสสิ่งแวดล้อม (environmental field)</p> <p>4. บรรยากาศทั่วไป (ต่อ) (ambient air) (cont.)</p>	<p>- สารอินทรีย์ระเหยง่าย (Volatile organic compounds, VOCs)</p> <ul style="list-style-type: none"> อะคริโนไทร์ (Acrylonitrile) 0.04 $\mu\text{g}/\text{m}^3$ ถึง 43.00 $\mu\text{g}/\text{m}^3$ (0.02 ppbv ถึง 20.00 ppbv) ไดคลอโรมีเทน (Dichloromethane) 0.14 $\mu\text{g}/\text{m}^3$ to 69.00 $\mu\text{g}/\text{m}^3$ (0.04 ppbv ถึง 20.00 ppbv) คาร์บอนไดซัลไฟด์ (Carbon disulfide) 0.06 $\mu\text{g}/\text{m}^3$ ถึง 62.00 $\mu\text{g}/\text{m}^3$ (0.02 ppbv ถึง 20.00 ppbv) ไตรคลอโรมีเทน (Trichloromethane) 0.20 $\mu\text{g}/\text{m}^3$ ถึง 97.00 $\mu\text{g}/\text{m}^3$ (0.04 ppbv ถึง 20.00 ppbv) 1,2-ไดคลอโรอีเทน (1,2-dichloroethane) 0.08 $\mu\text{g}/\text{m}^3$ ถึง 80.00 $\mu\text{g}/\text{m}^3$ (0.02 ppbv ถึง 20.00 ppbv) 	<p>- WI-7.2-1-24 based on US EPA , Compendium Method TO-15 , EPA/625/R-96/010b, Second edition, January 1999</p>

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สาขาการทดสอบ (Field of Testing)	รายการทดสอบ (Parameter)	วิธีทดสอบ (Test Method)
<p>สาขาสีสิ่งแวดล้อม (environmental field)</p> <p>4. บรรยากาศทั่วไป (ต่อ) (ambient air) (cont.)</p>	<p>- สารอินทรีย์ระเหยง่าย (Volatile organic compounds ,VOCs)</p> <ul style="list-style-type: none"> • เบนซีน (Benzene) 0.06 $\mu\text{g}/\text{m}^3$ ถึง 63.00 $\mu\text{g}/\text{m}^3$ (0.02 ppbv ถึง 20.00 ppbv) • คาร์บอนเตตระคลอไรด์ (Carbon tetrachloride) 0.25 $\mu\text{g}/\text{m}^3$ ถึง 125 $\mu\text{g}/\text{m}^3$ (0.04 ppbv ถึง 20.00 ppbv) • ไตรคลอโรเอทิลีน (Trichloroethylene) 0.21 $\mu\text{g}/\text{m}^3$ ถึง 107 $\mu\text{g}/\text{m}^3$ (0.04 ppbv ถึง 20.00 ppbv) • 1,2-ไดคลอโรโพรเพน (1,2-dichloropropane) 0.18 $\mu\text{g}/\text{m}^3$ ถึง 92.00 $\mu\text{g}/\text{m}^3$ (0.04 ppbv ถึง 20.00 ppbv) • เตตระคลอโรเอทิลีน (Tetrachloroethylene) 0.27 $\mu\text{g}/\text{m}^3$ ถึง 135 $\mu\text{g}/\text{m}^3$ (0.04 ppbv ถึง 20.00 ppbv) 	<p>- WI-7.2-1-24 based on US EPA , Compendium Method TO-15 , EPA/625/R-96/010b, Second edition, January 1999</p>

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สาขาการทดสอบ (Field of Testing)	รายการทดสอบ (Parameter)	วิธีทดสอบ (Test Method)
<p>สาขาสีสิ่งแวดล้อม (environmental field)</p> <p>4. บรรยากาศทั่วไป (ต่อ) (ambient air) (cont.)</p>	<p>- สารอินทรีย์ระเหยง่าย (Volatile organic compounds ,VOCs)</p> <ul style="list-style-type: none"> • 1,2-ไดโบรมีเอเทน (1,2-dibromoethane) 0.31 $\mu\text{g}/\text{m}^3$ ถึง 153 $\mu\text{g}/\text{m}^3$ (0.04 ppbv ถึง 20.00 ppbv) • 1,1,2,2-เตตระคลอโรเอทเทน (1,1,2,2-tetrachloroethane) 0.69 $\mu\text{g}/\text{m}^3$ ถึง 137 $\mu\text{g}/\text{m}^3$ (0.10 ppbv ถึง 20.00 ppbv) • เบนซิลคลอไรด์ (Benzyl chloride) 0.52 $\mu\text{g}/\text{m}^3$ ถึง 103 $\mu\text{g}/\text{m}^3$ (0.10 ppbv ถึง 20.00 ppbv) • 1,4-ไดคลอโรเบนซีน (1,4-dichlorobenzene) 0.24 $\mu\text{g}/\text{m}^3$ ถึง 120 $\mu\text{g}/\text{m}^3$ (0.04 ppbv ถึง 20.00 ppbv) 	<p>- WI-7.2-1-24 based on US EPA , Compendium Method TO-15 , EPA/625/R-96/010b, Second edition, January 1999</p>