

ภาคผนวก ง

ใบรับรองผลการตรวจวัดคุณภาพสิ่งแวดล้อม

ใบรับรองผลการตรวจวัดคุณภาพอากาศในบรรยากาศ



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

Location : With in Refinery Plant, North				Monitor Period : 16-23 May 2023			
Analyzer Model : API 100A				Station No : SS2-05			
Serial No : 382				Site Operator : Mr. Siwanon Kulawong			
Calibrator Model : Teledyne 700E				Serial No : 587			
Calibration Gas Cylinder I.D.: EB0108319							
Certified Date : 09 Jan 2023				Cal Concentration (ppb) : 0,100,200,400			
Expire Date : 08 Jan 2024							
Time	SO2 Concentration (ppb)						
	16-17 May 2023	17-18 May 2023	18-19 May 2023	19-20 May 2023	20-21 May 2023	21-22 May 2023	22-23 May 2023
08:00 - 09:00	5.2	4.7	5.8	5.5	6.0	4.6	5.1
09:00 - 10:00	5.4	4.9	5.8	5.7	7.0	4.4	5.7
10:00 - 11:00	5.3	4.9	5.9	6.2	6.6	4.8	5.7
11:00 - 12:00	4.5	5.0	6.1	5.7	6.0	4.7	5.3
12:00 - 13:00	4.7	5.1	5.8	5.8	7.1	4.2	5.6
13:00 - 14:00	4.5	4.4	4.7	6.2	6.1	7.1	4.9
14:00 - 15:00	4.3	4.5	4.7	6.1	5.8	7.6	5.0
15:00 - 16:00	4.3	4.9	5.1	6.0	6.2	5.4	4.6
16:00 - 17:00	6.9	4.8	4.4	6.0	5.0	5.0	4.5
17:00 - 18:00	5.2	5.3	4.3	5.3	4.9	5.0	4.6
18:00 - 19:00	5.2	7.0	4.3	4.2	4.8	5.2	4.6
19:00 - 20:00	5.2	5.4	4.2	4.3	4.9	4.7	4.8
20:00 - 21:00	4.7	4.3	4.2	4.7	4.4	4.6	5.1
21:00 - 22:00	4.6	4.2	4.2	4.2	4.4	4.5	4.9
22:00 - 23:00	4.6	4.2	4.2	4.3	4.5	4.3	4.8
23:00 - 00:00	4.7	4.3	4.2	4.4	4.5	4.4	4.6
00:00 - 01:00	4.2	4.3	4.3	4.4	4.4	4.4	4.5
01:00 - 02:00	4.3	4.3	4.3	4.4	4.4	4.4	4.5
02:00 - 03:00	4.2	4.3	4.3	4.4	4.5	4.4	4.5
03:00 - 04:00	4.2	4.2	4.3	4.4	4.5	4.3	4.4
04:00 - 05:00	4.2	4.2	4.3	4.3	4.4	4.3	4.5
05:00 - 06:00	4.1	4.2	4.5	4.4	4.2	4.3	4.4
06:00 - 07:00	4.1	4.2	5.0	5.0	4.3	4.4	4.3
07:00 - 08:00	4.2	5.3	5.5	5.6	4.3	4.5	4.3
Average-24Hr*	4.7	4.7	4.8	5.1	5.1	4.8	4.8
Max-1Hr	6.9	7.0	6.1	6.2	7.1	7.6	5.7
Min-1Hr	4.1	4.2	4.2	4.2	4.2	4.2	4.3
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

Preeda S.
(Miss Preeda Somjai)
Technical Management Team



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

Location : Map Ta Phut New Town				Monitor Period : 16-23 May 2023			
Analyzer Model : API 100A				Station No : Mobile 10			
Serial No : 342				Site Operator : Mr. Siwanon Kulawong			
Calibrator Model : Teledyne 700E				Serial No : 587			
Calibration Gas Cylinder I.D.: EB0108319							
Certified Date : 09 Jan 2023				Cal Concentration (ppb) : 0,100,200,400			
Expire Date : 08 Jan 2024							
Time	SO2 Concentration (ppb)						
	16-17 May 2023	17-18 May 2023	18-19 May 2023	19-20 May 2023	20-21 May 2023	21-22 May 2023	22-23 May 2023
16:00 - 17:00	4.7	3.2	3.0	4.5	3.8	3.4	3.1
17:00 - 18:00	6.6	3.7	3.0	4.0	3.5	3.2	3.1
18:00 - 19:00	5.9	5.3	3.3	3.1	3.9	3.1	3.2
19:00 - 20:00	4.1	3.9	3.1	3.0	3.6	2.6	3.1
20:00 - 21:00	3.6	3.0	3.0	3.5	3.3	3.1	3.5
21:00 - 22:00	3.4	2.9	3.0	3.0	3.3	3.3	3.3
22:00 - 23:00	3.4	2.9	2.9	3.0	3.3	3.0	3.2
23:00 - 00:00	3.3	2.9	2.9	2.9	3.5	3.1	3.2
00:00 - 01:00	2.8	2.9	3.0	2.8	3.4	3.1	3.1
01:00 - 02:00	3.0	2.8	2.9	2.9	3.3	3.3	3.2
02:00 - 03:00	2.9	2.8	2.8	2.9	3.2	3.1	3.2
03:00 - 04:00	2.8	2.8	2.8	2.9	3.2	3.0	3.1
04:00 - 05:00	2.8	2.8	2.8	3.0	3.2	3.0	3.1
05:00 - 06:00	2.9	2.9	2.9	3.0	3.2	3.1	3.0
06:00 - 07:00	2.9	2.9	3.5	3.5	3.2	3.1	3.1
07:00 - 08:00	2.8	3.9	4.1	4.0	3.2	3.1	3.1
08:00 - 09:00	3.3	4.4	4.0	4.5	3.3	3.5	3.6
09:00 - 10:00	3.3	4.2	4.0	5.6	3.1	4.0	3.0
10:00 - 11:00	3.3	4.2	4.5	5.0	3.1	3.9	3.0
11:00 - 12:00	3.3	4.2	4.1	4.5	2.9	3.4	2.8
12:00 - 13:00	3.4	3.8	3.9	5.0	6.5	3.6	2.8
13:00 - 14:00	2.9	2.8	4.4	4.6	5.5	3.1	2.9
14:00 - 15:00	2.8	2.9	4.5	4.0	5.8	3.3	3.0
15:00 - 16:00	3.1	3.4	4.6	4.6	7.9	3.1	5.0
Average-24Hr*	3.5	3.4	3.5	3.7	3.8	3.2	3.2
Max-1Hr	6.6	5.3	4.6	5.6	7.9	4.0	5.0
Min-1Hr	2.8	2.8	2.8	2.8	2.9	2.6	2.8
Standard-1Hr	300 ppb(780 ug/cu.m)						
Standard-24Hr	120 ppb(300 ug/cu.m)						

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

(Miss Katesarin Vorradetwittaya)
Environmental Scientist

Preeda S.
(Miss Preeda Somjai)
Technical Management Team



Ambient Air Monitoring Results : Sulfur dioxide

MTR-SPRC PLC-Refinery

Location : Ban Plong Community Monitor Period : 16-23 May 2023
 Analyzer Model : Teledyne T100 Station No : SS2-04
 Serial No : 119 Site Operator : Mr. Siwanon Kulawong

Calibrator Model : Teledyne 700E Serial No : 587
 Calibration Gas Cylinder I.D.: EB0108319
 Certified Date : 09 Jan 2023 Cal Concentration (ppb) : 0,100,200,400
 Expire Date : 08 Jan 2024

Time	SO2 Concentration (ppb)						
	16-17 May 2023	17-18 May 2023	18-19 May 2023	19-20 May 2023	20-21 May 2023	21-22 May 2023	22-23 May 2023
08:00 - 09:00	5.1	4.6	5.7	5.7	6.2	4.5	5.5
09:00 - 10:00	4.7	4.7	5.8	5.4	5.7	4.4	5.0
10:00 - 11:00	4.6	4.7	5.3	5.2	6.4	7.8	5.0
11:00 - 12:00	3.5	4.2	4.5	5.7	6.0	7.0	4.6
12:00 - 13:00	4.0	4.3	4.8	6.0	6.1	7.2	5.0
13:00 - 14:00	4.2	4.9	5.0	6.0	5.8	6.2	4.6
14:00 - 15:00	6.7	5.1	4.6	5.9	5.2	6.5	5.0
15:00 - 16:00	6.2	5.3	4.3	5.3	4.8	5.3	4.7
16:00 - 17:00	7.2	6.6	4.2	4.2	4.8	4.9	4.4
17:00 - 18:00	5.0	5.0	4.1	4.1	4.7	4.3	4.4
18:00 - 19:00	4.3	4.0	4.1	4.5	4.1	4.3	4.3
19:00 - 20:00	4.4	4.0	4.1	4.1	4.1	4.3	4.3
20:00 - 21:00	4.5	4.0	4.1	4.0	4.1	4.4	4.4
21:00 - 22:00	4.4	3.9	4.0	4.1	4.1	4.2	4.3
22:00 - 23:00	3.9	4.0	4.1	4.3	4.1	4.3	4.3
23:00 - 00:00	4.1	4.1	4.2	4.3	4.1	4.3	4.4
00:00 - 01:00	4.2	4.2	4.3	4.3	4.2	4.4	4.4
01:00 - 02:00	4.2	4.2	4.3	4.2	4.1	4.3	4.4
02:00 - 03:00	4.1	4.1	4.2	4.2	4.2	4.3	4.4
03:00 - 04:00	4.0	4.1	4.2	4.2	4.2	4.3	4.4
04:00 - 05:00	4.1	4.1	4.5	4.6	4.2	4.3	4.3
05:00 - 06:00	4.1	5.1	5.1	5.2	4.0	4.2	4.2
06:00 - 07:00	4.5	5.7	5.0	5.6	4.1	4.8	4.8
07:00 - 08:00	4.6	5.7	5.3	6.7	4.3	5.4	4.4
Average-24Hr*	4.6	4.6	4.6	4.9	4.7	5.0	4.6
Max-1Hr	7.2	6.6	5.8	6.7	6.4	7.8	5.5
Min-1Hr	3.5	3.9	4.0	4.0	4.0	4.2	4.2
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 : Nitrogen dioxide

MTR-SPRC PLC-Refinery

Location : With in Refinery Plant, North Monitor Period : 16-23 May 2023
 Analyzer Model : Teledyne T200 Station No : SS2-05
 Serial No : 110 Site Operator : Mr. Siwanon Kulawong

Calibrator Model : Teledyne 700E Serial No : 587
 Calibration Gas Cylinder I.D.: EB0108319
 Certified Date : 09 Jan 2023 Cal Concentration (ppb) : 0,100,200,400
 Expire Date : 08 Jan 2024

Time	NO2 Concentration (ppb)						
	16-17 May 2023	17-18 May 2023	18-19 May 2023	19-20 May 2023	20-21 May 2023	21-22 May 2023	22-23 May 2023
08:00 - 09:00	7.2	4.4	4.5	5.2	5.0	4.3	6.4
09:00 - 10:00	5.5	4.7	5.5	7.2	6.0	3.8	5.6
10:00 - 11:00	5.1	4.6	4.1	5.5	6.8	3.6	4.8
11:00 - 12:00	5.8	4.6	4.3	4.9	6.3	4.3	5.6
12:00 - 13:00	5.3	4.6	5.7	5.5	5.1	4.4	5.9
13:00 - 14:00	5.3	4.1	6.5	5.7	5.0	6.5	5.3
14:00 - 15:00	5.1	6.5	4.4	6.2	5.4	6.8	4.5
15:00 - 16:00	5.3	5.5	5.1	5.0	5.1	6.7	5.0
16:00 - 17:00	5.9	5.0	4.9	5.1	4.3	5.7	6.1
17:00 - 18:00	5.7	5.0	4.6	4.1	4.0	5.1	6.3
18:00 - 19:00	5.9	5.7	3.7	3.7	3.7	5.8	5.6
19:00 - 20:00	4.7	6.0	4.3	3.5	3.4	5.0	4.2
20:00 - 21:00	4.1	4.7	3.3	3.4	3.3	4.8	4.0
21:00 - 22:00	3.4	4.3	3.1	3.2	2.8	3.1	3.9
22:00 - 23:00	3.4	4.5	3.2	3.1	3.2	3.1	4.0
23:00 - 00:00	3.9	5.0	4.1	4.4	3.2	3.8	4.8
00:00 - 01:00	4.5	4.7	4.5	4.8	3.2	3.4	4.9
01:00 - 02:00	4.4	5.1	3.6	4.3	3.4	3.7	4.6
02:00 - 03:00	5.7	6.5	3.7	5.1	3.5	3.7	5.4
03:00 - 04:00	5.9	6.2	4.6	5.2	4.6	4.8	6.4
04:00 - 05:00	6.2	6.1	5.3	6.3	5.8	4.9	6.7
05:00 - 06:00	6.1	6.2	5.7	6.0	5.5	6.6	6.0
06:00 - 07:00	5.7	5.7	5.2	6.8	5.4	6.8	6.0
07:00 - 08:00	5.5	5.1	5.3	6.0	4.4	7.0	6.2
Average-24Hr*	5.2	5.2	4.6	5.0	4.5	4.9	5.3
Max-1Hr	7.2	6.5	6.5	7.2	6.8	7.0	6.7
Min-1Hr	3.4	4.1	3.1	3.1	2.8	3.1	3.9
Standard-1Hr	170 ppb(320 ug/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 : Nitrogen dioxide MTR-SPRC PLC-Refinery

Location : Map Ta Phut New Town Monitor Period : 16-23 May 2023
Analyzer Model : API 200A Station No : Mobile 10
Serial No : 2384 Site Operator : Mr. Siwanon Kulawong

Calibrator Model : Teledyne 700E Serial No : 587
Calibration Gas Cylinder I.D.: EB0108319
Certified Date : 09 Jan 2023 Cal Concentration (ppb) : 0,100,200,400
Expire Date : 08 Jan 2024

Time	NO2 Concentration (ppb)						
	16-17 May 2023	17-18 May 2023	18-19 May 2023	19-20 May 2023	20-21 May 2023	21-22 May 2023	22-23 May 2023
16:00 - 17:00	4.9	5.1	4.5	4.3	4.5	5.9	7.1
17:00 - 18:00	3.7	7.0	5.2	6.7	6.0	4.7	5.3
18:00 - 19:00	6.4	5.1	5.2	3.4	6.9	3.2	4.6
19:00 - 20:00	7.7	5.6	6.1	3.6	8.1	3.9	6.9
20:00 - 21:00	8.5	6.8	6.9	4.1	5.5	4.5	8.7
21:00 - 22:00	7.9	5.9	5.8	5.4	5.5	9.1	8.4
22:00 - 23:00	8.4	9.3	4.5	6.2	5.3	8.7	6.0
23:00 - 00:00	8.2	6.2	4.1	3.9	3.5	7.6	3.7
00:00 - 01:00	7.2	4.5	3.7	3.9	3.5	3.7	3.7
01:00 - 02:00	5.3	4.4	3.6	3.9	3.5	4.0	3.2
02:00 - 03:00	4.9	4.4	3.6	3.3	2.9	3.5	5.6
03:00 - 04:00	4.6	4.6	3.4	3.1	2.9	3.6	5.1
04:00 - 05:00	4.4	4.0	3.2	2.9	2.7	4.6	4.2
05:00 - 06:00	4.2	4.3	3.2	3.5	2.8	3.2	4.8
06:00 - 07:00	4.6	4.1	3.6	3.8	4.1	4.0	5.7
07:00 - 08:00	6.3	5.3	4.8	4.9	4.1	6.2	7.4
08:00 - 09:00	5.9	4.7	4.5	4.3	4.1	4.8	7.3
09:00 - 10:00	6.6	6.3	3.4	5.2	4.5	5.5	5.1
10:00 - 11:00	6.5	7.7	4.2	5.5	4.5	4.8	3.9
11:00 - 12:00	6.0	5.1	5.4	5.1	5.6	6.6	5.6
12:00 - 13:00	5.2	4.4	5.4	5.2	6.0	3.7	6.5
13:00 - 14:00	4.7	4.4	4.5	5.2	5.8	5.4	6.3
14:00 - 15:00	5.2	4.7	5.5	7.5	6.0	5.2	4.7
15:00 - 16:00	5.4	4.5	5.3	5.9	6.0	6.3	7.9
Average-24Hr*	5.9	5.4	4.6	4.6	4.8	5.1	5.7
Max-1Hr	8.5	9.3	6.9	7.5	8.1	9.1	8.7
Min-1Hr	3.7	4.0	3.2	2.9	2.7	3.2	3.2
Standard-1Hr	170 ppb(320 ug/cu.m)						
Standard-24Hr	-						

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

(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 : 16-23 May 2023
Analyzer Model : API 200AU Station No : SS2-04
Serial No : 119 Site Operator : Mr. Siwanon Kulawong

Calibrator Model : Teledyne 700E Serial No : 587
Calibration Gas Cylinder I.D.: EB0108319
Certified Date : 09 Jan 2023 Cal Concentration (ppb) : 0,100,200,400
Expire Date : 08 Jan 2024

Time	NO2 Concentration (ppb)						
	16-17 May 2023	17-18 May 2023	18-19 May 2023	19-20 May 2023	20-21 May 2023	21-22 May 2023	22-23 May 2023
08:00 - 09:00	4.7	4.4	3.8	4.6	4.6	4.4	5.8
09:00 - 10:00	3.4	5.4	4.1	5.9	4.6	3.8	4.6
10:00 - 11:00	4.2	4.2	4.2	3.4	4.6	2.7	4.3
11:00 - 12:00	4.9	5.2	5.1	3.0	5.3	3.2	5.5
12:00 - 13:00	4.9	5.1	6.0	3.3	3.8	4.0	5.7
13:00 - 14:00	4.2	5.8	5.6	4.5	5.4	7.0	6.4
14:00 - 15:00	6.0	7.6	5.0	4.9	5.5	7.1	5.7
15:00 - 16:00	6.4	6.5	4.6	4.0	4.5	7.2	5.2
16:00 - 17:00	6.1	5.7	4.3	3.6	3.6	3.2	4.9
17:00 - 18:00	6.6	4.4	3.8	3.5	3.1	3.1	3.9
18:00 - 19:00	6.1	3.6	3.0	3.3	3.0	2.9	4.6
19:00 - 20:00	4.2	3.8	2.5	2.9	2.7	3.4	3.6
20:00 - 21:00	4.1	3.7	2.3	2.3	2.0	4.3	4.0
21:00 - 22:00	3.8	2.7	2.6	2.2	2.2	2.9	4.1
22:00 - 23:00	3.8	2.8	2.5	2.3	2.7	3.2	3.6
23:00 - 00:00	4.6	3.7	3.0	3.6	2.6	3.8	3.7
00:00 - 01:00	4.8	3.4	4.3	3.4	3.6	3.8	4.8
01:00 - 02:00	5.5	5.1	3.9	3.7	3.8	5.4	5.9
02:00 - 03:00	5.8	5.2	3.7	4.0	3.6	4.3	5.6
03:00 - 04:00	6.5	5.4	4.6	3.8	4.5	6.8	5.6
04:00 - 05:00	5.1	4.7	5.2	4.4	4.3	4.8	5.4
05:00 - 06:00	4.2	3.9	3.9	4.4	5.1	5.4	5.2
06:00 - 07:00	4.4	4.2	4.1	4.9	4.4	4.5	3.8
07:00 - 08:00	4.6	3.9	4.1	3.6	4.5	5.4	5.5
Average-24Hr*	5.0	4.6	4.0	3.7	3.9	4.4	4.9
Max-1Hr	6.6	7.6	6.0	5.9	5.5	7.2	6.4
Min-1Hr	3.4	2.7	2.3	2.2	2.0	2.7	3.6
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 : Carbon monoxide MTR-SPRC PLC-Refinery

Location : With in Refinery Plant, North				Monitor Period : 16-23 May 2023			
Analyzer Model : API 300A				Station No : SS2-05			
Serial No : 1077				Site Operator : Mr. Siwanon Kulawong			
Calibrator Model : Teledyne 700E				Serial No : 587			
Calibration Gas Cylinder I.D.: EB0108319							
Certified Date : 09 Jan 2023				Cal Concentration (ppb) : 0,100,200,400			
Expire Date : 08 Jan 2024							
Time	CO Concentration (ppm)						
	16-17 May 2023	17-18 May 2023	18-19 May 2023	19-20 May 2023	20-21 May 2023	21-22 May 2023	22-23 May 2023
08:00 - 09:00	0.4	1.3	0.2	0.3	0.6	1.2	1.5
09:00 - 10:00	0.4	1.3	1.4	0.6	0.8	1.1	0.3
10:00 - 11:00	0.8	0.8	0.5	0.9	0.9	0.5	0.3
11:00 - 12:00	0.6	1.3	1.1	1.3	1.1	0.8	1.4
12:00 - 13:00	1.3	1.1	1.4	1.0	1.5	0.8	0.8
13:00 - 14:00	0.5	1.2	0.7	0.6	1.0	0.4	0.5
14:00 - 15:00	0.9	1.2	1.1	0.8	0.7	0.9	0.2
15:00 - 16:00	1.0	0.3	1.1	1.0	0.9	1.4	1.3
16:00 - 17:00	0.2	0.4	1.2	0.2	1.4	0.3	0.4
17:00 - 18:00	0.8	1.4	1.4	0.8	0.5	0.4	1.4
18:00 - 19:00	0.4	0.4	0.3	1.0	0.6	1.1	0.3
19:00 - 20:00	1.2	1.3	0.4	0.8	0.6	0.4	0.5
20:00 - 21:00	1.0	0.7	0.8	0.5	0.6	0.3	0.5
21:00 - 22:00	1.0	0.6	0.3	1.2	1.1	0.6	0.6
22:00 - 23:00	0.3	0.6	1.1	0.5	0.7	1.4	1.0
23:00 - 00:00	0.7	0.4	0.7	1.1	1.0	0.6	0.8
00:00 - 01:00	1.5	1.3	0.2	1.1	0.4	0.6	1.1
01:00 - 02:00	1.0	0.7	1.1	0.8	0.9	1.0	1.1
02:00 - 03:00	0.3	0.4	0.4	1.1	1.2	0.9	0.5
03:00 - 04:00	1.1	1.1	1.2	0.9	0.4	0.4	1.1
04:00 - 05:00	0.7	1.2	0.7	0.7	1.4	1.4	0.5
05:00 - 06:00	0.9	1.1	1.3	0.5	1.0	0.6	1.5
06:00 - 07:00	1.1	1.1	0.9	0.7	1.0	1.1	0.5
07:00 - 08:00	0.2	0.3	0.2	0.8	1.2	0.6	1.2
Average-24Hr*	0.8	0.9	0.8	0.8	0.9	0.8	0.8
Max-1Hr	1.5	1.4	1.4	1.3	1.5	1.4	1.5
Min-1Hr	0.2	0.3	0.2	0.2	0.4	0.3	0.2
Standard-1Hr	30 ppm(34.2 mg/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 : Carbon monoxide MTR-SPRC PLC-Refinery

Location : Map Ta Phut New Town				Monitor Period : 16-23 May 2023			
Analyzer Model : Teledyne 300E				Station No : Mobile 10			
Serial No : 924				Site Operator : Mr. Siwanon Kulawong			
Calibrator Model : Teledyne 700E				Serial No : 587			
Calibration Gas Cylinder I.D.: EB0108319							
Certified Date : 09 Jan 2023				Cal Concentration (ppb) : 0,100,200,400			
Expire Date : 08 Jan 2024							
Time	CO Concentration (ppm)						
	16-17 May 2023	17-18 May 2023	18-19 May 2023	19-20 May 2023	20-21 May 2023	21-22 May 2023	22-23 May 2023
16:00 - 17:00	0.8	1.0	1.2	1.5	1.2	0.8	0.9
17:00 - 18:00	0.9	0.3	1.3	1.0	0.8	0.3	1.3
18:00 - 19:00	1.0	0.2	1.2	1.2	1.3	0.2	1.1
19:00 - 20:00	0.6	0.9	1.5	0.9	0.8	0.6	1.5
20:00 - 21:00	0.5	0.7	1.4	0.7	1.2	0.7	0.5
21:00 - 22:00	1.3	0.5	1.1	0.6	0.3	1.3	1.1
22:00 - 23:00	1.5	0.4	0.6	1.0	0.8	0.7	1.4
23:00 - 00:00	1.1	0.7	0.9	0.7	0.8	1.1	0.9
00:00 - 01:00	1.3	1.4	1.1	1.1	1.0	0.6	1.1
01:00 - 02:00	0.7	0.3	0.6	0.5	1.2	1.4	0.8
02:00 - 03:00	0.7	0.7	0.4	0.3	1.3	1.3	1.3
03:00 - 04:00	0.8	1.1	1.4	0.9	0.3	1.1	1.5
04:00 - 05:00	0.2	1.3	0.9	0.4	0.7	1.4	0.5
05:00 - 06:00	0.8	1.3	0.8	1.1	0.8	1.2	1.0
06:00 - 07:00	1.3	1.4	1.0	0.7	1.0	0.3	0.9
07:00 - 08:00	0.9	0.6	0.6	0.4	0.7	1.3	1.1
08:00 - 09:00	0.5	1.0	1.1	0.4	1.0	0.3	1.3
09:00 - 10:00	1.1	0.8	0.7	0.3	0.6	1.5	0.3
10:00 - 11:00	0.8	0.3	1.5	1.1	1.1	0.4	0.7
11:00 - 12:00	0.3	0.9	0.5	0.7	1.4	0.3	1.5
12:00 - 13:00	1.3	0.8	1.5	0.7	0.4	0.7	0.7
13:00 - 14:00	1.1	0.7	0.2	1.2	0.9	1.4	1.4
14:00 - 15:00	1.1	0.7	0.8	1.4	0.5	0.3	0.6
15:00 - 16:00	0.5	0.3	0.5	1.1	0.4	1.1	1.0
Average-24Hr*	0.9	0.8	1.0	0.8	0.9	0.8	1.0
Max-1Hr	1.5	1.4	1.5	1.5	1.4	1.5	1.5
Min-1Hr	0.2	0.2	0.2	0.3	0.3	0.2	0.3
Standard-1Hr	30 ppm(34.2 mg/cu.m)						
Standard-24Hr	-						

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

(Miss Katesarin Vorradetwittaya)
Environmental Scientist

Preeda S.
(Miss Preeda Somjai)
Technical Management Team



Ambient Air Monitoring Results : Carbon monoxide MTR-SPRC PLC-Refinery

Location : Ban Plong Community		Monitor Period : 16-23 May 2023					
Analyzer Model : API 300A		Station No : SS2-04					
Serial No : 1343		Site Operator : Mr. Siwanon Kulawong					
Calibrator Model : Teledyne 700E		Serial No : 587					
Calibration Gas Cylinder I.D.: EB0108319							
Certified Date : 09 Jan 2023		Cal Concentration (ppb) : 0,100,200,400					
Expire Date : 08 Jan 2024							
Time	CO Concentration (ppm)						
	16-17 May 2023	17-18 May 2023	18-19 May 2023	19-20 May 2023	20-21 May 2023	21-22 May 2023	22-23 May 2023
08:00 - 09:00	0.7	0.6	0.6	1.4	1.1	1.2	0.5
09:00 - 10:00	0.6	1.0	0.7	0.4	1.1	0.4	1.5
10:00 - 11:00	1.4	1.4	1.0	1.2	0.8	0.4	0.7
11:00 - 12:00	0.3	0.6	1.2	0.2	0.9	0.9	0.9
12:00 - 13:00	0.9	0.3	0.6	0.4	1.0	0.3	0.6
13:00 - 14:00	1.4	0.7	1.2	1.4	0.9	0.9	0.6
14:00 - 15:00	1.2	0.6	1.4	0.3	1.3	0.8	1.5
15:00 - 16:00	1.3	0.5	1.2	0.6	1.1	0.7	0.9
16:00 - 17:00	0.5	1.1	0.5	1.1	0.7	1.1	0.8
17:00 - 18:00	1.0	1.0	1.0	0.6	0.3	0.6	0.3
18:00 - 19:00	0.7	1.5	1.2	0.3	1.2	1.1	1.3
19:00 - 20:00	0.8	0.8	0.5	0.3	0.2	1.4	0.4
20:00 - 21:00	1.0	0.9	0.3	0.3	1.0	1.4	1.4
21:00 - 22:00	1.4	0.8	1.2	1.4	0.8	0.6	0.8
22:00 - 23:00	0.5	0.4	0.8	1.1	1.3	0.9	0.3
23:00 - 00:00	0.2	1.1	1.1	0.3	0.6	0.6	0.3
00:00 - 01:00	1.1	1.3	0.4	0.8	0.7	0.4	0.8
01:00 - 02:00	1.1	1.2	0.2	0.9	0.6	1.0	0.4
02:00 - 03:00	1.0	0.9	1.0	0.3	0.6	0.5	0.5
03:00 - 04:00	0.8	1.4	0.3	0.3	0.6	0.3	1.5
04:00 - 05:00	0.9	1.2	0.6	0.6	0.6	0.6	1.1
05:00 - 06:00	0.3	0.2	0.9	0.6	0.8	1.3	0.8
06:00 - 07:00	0.6	0.4	1.0	1.0	1.3	0.7	0.4
07:00 - 08:00	1.2	1.2	0.2	1.2	0.4	0.9	0.6
Average-24Hr*	0.9	0.9	0.8	0.7	0.8	0.8	0.8
Max-1Hr	1.4	1.5	1.4	1.4	1.3	1.4	1.5
Min-1Hr	0.2	0.2	0.2	0.2	0.2	0.3	0.3
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



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AMBIENT AIR QUALITY ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REFERENCE NO.	: SPRC-222303-COA-Amb/H ₂ S
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING DATE	: 19-21/05/2023
RECEIVE DATE	: 25/05/2023	ANALYTICAL DATE	: 26/05/2023
REPORT DATE	: 02/06/2023	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	19/05/2023	ppm	<0.001	ND	ND	ND	Intersociety Committee
(1 hr)	20/05/2023	ppm	<0.001	ND	ND	ND	Method 701
	21/05/2023	ppm	<0.001	ND	ND	ND	

Phatchara Samanchan
(Miss Phatchara Samanchan)
Analyst

Narisa Poowasanpeth
(Miss Narisa Poowasanpeth)
Technical Management Team

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

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AMBIENT AIR QUALITY ANALYSIS REPORT

CLIENT NAME : Star Petroleum Refining Public Co., Ltd. REF. NO. : SPRC-223003-COA-Amb/TSP
SAMPLING BY : SECOT Co., Ltd. SAMPLING DATE : 16-23/05/2023
RECEIVED DATE : 25/05/2023 ANALYTICAL DATE : 29-31/05/2023
REPORT DATE : 01/06/2023 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.)	16-17/05/2023	mg/m ³	0.042	0.043	0.089	0.330	High Volume
	17-18/05/2023	mg/m ³	0.037	0.044	0.058		Air Sampler/
	18-19/05/2023	mg/m ³	0.035	0.053	0.062		Gravimetric
	19-20/25/2023	mg/m ³	0.047	0.055	0.073		Method
	20-21/05/2023	mg/m ³	0.050	0.054	0.065		
	21-22/05/2023	mg/m ³	0.038	0.062	0.074		
	22-23/05/2023	mg/m ³	0.044	0.057	0.068		

Phatchara Samanchan

(Miss Phatchara Samanchan)

Analyst

Narisa Poowasanpetch

(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-222003-COA-Amb/PM10
SAMPLING BY : SECOT Co., Ltd. SAMPLING DATE : 16-23/05/2023
RECEIVED DATE : 25/05/2023 ANALYTICAL DATE : 29-31/05/2023
REPORT DATE : 01/06/2023 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.)	16-17/05/2023	mg/m ³	0.031	0.030	0.042	0.120	High Volume
	17-18/05/2023	mg/m ³	0.027	0.028	0.029		Air Sampler
	18-19/05/2023	mg/m ³	0.024	0.034	0.030		(Hi-Vol PM-10
	19-20/25/2023	mg/m ³	0.033	0.037	0.035		Size Selective Inlet)
	20-21/05/2023	mg/m ³	0.032	0.034	0.032		Gravimetric
	21-22/05/2023	mg/m ³	0.028	0.040	0.038		Method
	22-23/05/2023	mg/m ³	0.033	0.039	0.035		

Phatchara Samanchan

(Miss Phatchara Samanchan)

Analyst

Narisa Poowasanpetch

(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.	: 0008/66
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Subatmospheric Pressure Sampling
SAMPLING DATE	: 03-04/01/2023	ANALYTICAL DATE	: 09/01/2023
SAMPLING TIME	: 15:10-14:30	SAMPLE CONDITION	: Normal
RECEIVED DATE	: 05/01/2023	FILE CODE	: 223003_TO-15_January
REPORT DATE	: 12/01/2023		

Compound	Non Detection		SAMPLING LOCATION		STANDARD* (µg/m ³)
			Map Ta Phut New Town		
	ppbv	µg/m ³	ppbv	µg/m ³	
Benzene	0.004	0.013	1.09	3.48	7.6

Methods for the Determination of Toxic Organic Compound in Ambient Air, 3rd : EPA Methods TO-15,1999

Siriwan Chimsa-nga
(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.	: 0008/66
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Subatmospheric Pressure Sampling
SAMPLING DATE	: 03-04/01/2023	ANALYTICAL DATE	: 09/01/2023
SAMPLING TIME	: 13:58-13:39	SAMPLE CONDITION	: Normal
RECEIVED DATE	: 05/01/2023	FILE CODE	: 223003_TO-15_January
REPORT DATE	: 12/01/2023		

Compound	SAMPLING LOCATION				STANDARD* (µg/m ³)
	Non Detection		Ban Pong Community		
	ppbv	µg/m ³	ppbv	µg/m ³	
Benzene	0.004	0.013	0.83	2.65	7.6

Methods for the Determination of Toxic Organic Compound in Ambient Air, 3rd : EPA Methods TO-15,1999

Siriwan Chimsa-nga
(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.	: 0164/66
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Subatmospheric Pressure Sampling
SAMPLING DATE	: 02-03/02/2023	ANALYTICAL DATE	: 06-07/02/2023
SAMPLING TIME	: 15:25-15:08	SAMPLE CONDITION	: Normal
RECEIVED DATE	: 04/02/2023	FILE CODE	: 223003_TO-15_February
REPORT DATE	: 09/02/2023		

Compound	Non Detection		SAMPLING LOCATION		STANDARD*
	ppbv	µg/m ³	Map Ta Phut New Town	µg/m ³	
Benzene	0.004	0.013	0.83	2.65	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

M R

(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.	: 0164/66
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Subatmospheric Pressure Sampling
SAMPLING DATE	: 02-03/02/2023	ANALYTICAL DATE	: 06-07/02/2023
SAMPLING TIME	: 13:37-12:50	SAMPLE CONDITION	: Normal
RECEIVED DATE	: 04/02/2023	FILE CODE	: 223003_TO-15_February
REPORT DATE	: 09/02/2023		

Compound	Non Detection		SAMPLING LOCATION		STANDARD*
	ppbv	µg/m ³	Ban Pong Community	µg/m ³	
Benzene	0.004	0.013	1.57	5.02	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

M R

(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.	: 0348/66
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Subatmospheric Pressure Sampling
SAMPLING DATE	: 02-03/03/2023	ANALYTICAL DATE	: 07/03/2023
SAMPLING TIME	: 11:58-11:06	SAMPLE CONDITION	: Normal
RECEIVED DATE	: 04/03/2023	FILE CODE	: 223003_TO-15_March
REPORT DATE	: 13/03/2023		

Compound	Non Detection		SAMPLING LOCATION		STANDARD* (µg/m ³)
			Map Ta Phut New Town		
	ppbv	µg/m ³	ppbv	µg/m ³	
Benzene	0.004	0.013	0.85	2.72	7.6

Methods for the Determination of Toxic Organic Compound in Ambient Air, 3rd : EPA Methods TO-15,1999

Jutarat Jaemruen

(Miss Jutarat Jaemruen)

Analyst

Araya Tipparuk

(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.	: 0348/66
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Subatmospheric Pressure Sampling
SAMPLING DATE	: 02-03/03/2023	ANALYTICAL DATE	: 07/03/2023
SAMPLING TIME	: 11:48-11:19	SAMPLE CONDITION	: Normal
RECEIVED DATE	: 04/03/2023	FILE CODE	: 223003_TO-15_March
REPORT DATE	: 13/03/2023		

Compound	Non Detection		SAMPLING LOCATION		STANDARD ^a (µg/m ³)
	Ban Plong Community				
	ppbv	µg/m ³	ppbv	µg/m ³	
Benzene	0.004	0.013	1.59	5.08	7.6

Methods for the Determination of Toxic Organic Compound in Ambient Air, 3rd : EPA Methods TO-15,1999

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(Miss Jutarat Jaemruen)

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.	: 0528/66
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Subatmospheric Pressure Sampling
SAMPLING DATE	: 03-04/04/2023	ANALYTICAL DATE	: 06/04/2023
SAMPLING TIME	: 14:30-14:20	SAMPLE CONDITION	: Normal
RECEIVED DATE	: 05/04/2023	FILE CODE	: 223003_TO-15_April
REPORT DATE	: 11/04/2023		

Compound	Non Detection		SAMPLING LOCATION		STANDARD*
	ppbv	µg/m ³	Map Ta Phut New Town	µg/m ³	
Benzene	0.004	0.013	0.17	0.54	7.6

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

Jutarat Jaemruen

(Miss Jutarat Jaemruen)

Analyst

Araya Tipparak

(Mrs. Araya Tipparak)

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AMBIENT AIR QUALITY ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No.	: 0528/66
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Subatmospheric Pressure Sampling
SAMPLING DATE	: 03-04/04/2023	ANALYTICAL DATE	: 06/04/2023
SAMPLING TIME	: 14:15-14:00	SAMPLE CONDITION	: Normal
RECEIVED DATE	: 05/04/2023	FILE CODE	: 223003_TO-15_April
REPORT DATE	: 11/04/2023		

Compound	Non Detection		SAMPLING LOCATION		STANDARD*
	ppbv	µg/m ³	Ban Plong Community	µg/m ³	
Benzene	0.004	0.013	0.32	1.02	7.6

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

Jutarat Jaemruen

(Miss Jutarat Jaemruen)

Analyst

Araya Tipparak

(Mrs. Araya Tipparak)

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AMBIENT AIR QUALITY ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No.	: 0782/66
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Subatmospheric Pressure Sampling
SAMPLING DATE	: 16-17/05/2023	ANALYTICAL DATE	: 19-20, 22/05/2023
SAMPLING TIME	: 18:08-17:10	SAMPLE CONDITION	: Normal
RECEIVED DATE	: 18/05/2023	FILE CODE	: 223003_TO-15_May
REPORT DATE	: 26/05/2023		

Compound	Non Detection		SAMPLING LOCATION		STANDARD* (µg/m ³)
			Map Ta Phut New Town		
	ppbv	µg/m ³	ppbv	µg/m ³	
Benzene	0.004	0.013	0.86	2.75	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

MR

(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.	: 0782/66
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Subatmospheric Pressure Sampling
SAMPLING DATE	: 16-17/05/2023	ANALYTICAL DATE	: 19-20, 22/05/2023
SAMPLING TIME	: 17:26-16:30	SAMPLE CONDITION	: Normal
RECEIVED DATE	: 18/05/2023	FILE CODE	: 223003_TO-15_May
REPORT DATE	: 26/05/2023		

Compound	Non Detection		SAMPLING LOCATION		STANDARD* (µg/m ³)
			Ban Pong Community		
	ppbv	µg/m ³	ppbv	µg/m ³	
Benzene	0.004	0.013	1.52	4.86	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

MR

(Mrs. Araya Tipparuk)

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AMBIENT AIR QUALITY ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No.	: 0883/66
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Subatmospheric Pressure Sampling
SAMPLING DATE	: 01-02/06/2023	ANALYTICAL DATE	: 06-07/06/2023
SAMPLING TIME	: 11:50-11:34	SAMPLE CONDITION	: Normal
RECEIVED DATE	: 03/06/2023	FILE CODE	: 223003_TO-15_June
REPORT DATE	: 09/06/2023		

Compound	Non Detection		SAMPLING LOCATION		STANDARD*
	ppbv	µg/m ³	Map Ta Phut New Town	µg/m ³	
Benzene	0.004	0.013	0.50	1.60	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

MTL

(Mrs. Araya Tipparuk)

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AMBIENT AIR QUALITY ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No.	: 1010/66
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Subatmospheric Pressure Sampling
SAMPLING DATE	: 19-20/06/2023	ANALYTICAL DATE	: 26/06/2023
SAMPLING TIME	: 11:41-11:09	SAMPLE CONDITION	: Normal
RECEIVED DATE	: 21/06/2023	FILE CODE	: 223003_TO-15_June
REPORT DATE	: 29/06/2023		

Compound	Non Detection		SAMPLING LOCATION		STANDARD*
	ppbv	µg/m ³	Ban Plong Community	µg/m ³	
Benzene	0.004	0.013	1.58	5.05	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

MTL

(Mrs. Araya Tipparuk)

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ใบรับรองผลการตรวจวัดคุณภาพอากาศจากปล่องระบายอากาศ



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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-223003-COA-Stk/PM
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING DATE	: 19/05/2023
RECEIVED DATE	: 22/05/2023	ANALYTICAL DATE	: 24-25/05/2023
REPORT DATE	: 29/05/2023	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	: 16.2	m/s
Diameter	: 3.2	m	Flow rate ⁽¹⁾	: 3,762	Ncu.m/min
Temperature	: 279.3	°C	Excess Oxygen	: 3.3	%

PARAMETER	UNIT	RESULTS ⁽¹⁾		ASSIGNED VALUE ⁽²⁾	STANDARD ⁽³⁾	REFERENCE METHODS
		3.3 % O ₂	7 % O ₂			
Particulate Matter	mg/Ncu.m	118.2	93.4	240	320	US EPA Method 5

Phatchara Samanchan

(Miss Phatchara Samanchan)

Analyst

REG.NO. 7-239-ท-8183

Main Poowasanpetch

(Miss Narisa Poowasanpetch)

Technical Management Team

REG.NO. 7-239-ท-6419

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).



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STACK EMISSION ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REFERENCE NO.	: Refinery-223003-COA-Stk/HM
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING DATE	: 19/05/2023
RECEIVED DATE	: 22/05/2023	ANALYTICAL DATE	: 22-26/05/2023
REPORT DATE	: 09/06/2023	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	: 16.2	m/s
Diameter	: 3.2	m	Flow rate ⁽¹⁾	: 3,762	Ncu.m/min
Temperature	: 279.3	°C	Excess Oxygen	: 3.3	%

PARAMETER	UNIT	RESULTS ⁽¹⁾		ASSIGNED VALUE ⁽²⁾	STANDARD ⁽³⁾	REFERENCE METHODS
		3.3 % 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	<0.02	<0.02	5.0	5.0	US EPA Method 29

Krisana Chanthoom

(Miss Krisana Chanthoom)

Analyst

REG.NO. 7-239-ท-7802

Main Poowasanpetch

(Miss Narisa Poowasanpetch)

Technical Management Team

REG.NO. 7-239-ท-6419

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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
RFCCU
STAR PETROLEUM REFINING PUBLIC CO., LTD.
May 19, 2023

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	3.33	3.28	155.87	155.92	123.00
2	3.37	3.33	155.70	155.75	123.22
3	3.35	3.32	155.31	155.35	122.83
Average	3.35	3.31	155.63	155.67	123.02

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	3.33	3.28	713.28	713.28	562.69
2	3.37	3.33	719.90	719.89	569.52
3	3.35	3.32	722.36	722.35	571.14
Average	3.35	3.31	718.51	718.51	567.78

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	3.33	3.28	215.27	215.32	169.86
2	3.37	3.33	217.28	217.33	171.93
3	3.35	3.32	218.45	218.49	172.75
Average	3.35	3.31	217.00	217.05	171.51

STAR PETROLEUM REFINING PUBLIC CO., LTD.
EMISSION TEST RESULT

Date: May 19, 2023
Start time: 11:20 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 : Fuel Gas

Run # : 1
Location : RFCCU
Finish time : 11:40 AM
Serial No.: 111117-2
Serial No.: 433
Serial No.: 060
Serial No.: 388
Test Operator : Song H.

Time, min	O ₂ (%)	NO _x (ppm)	SO ₂ (ppm)	CO (ppm)
11:20 AM	3.26	154.63	715.13	207.54
11:21 AM	3.27	154.34	715.39	209.81
11:22 AM	3.32	154.13	713.53	211.57
11:23 AM	3.31	151.18	713.12	228.17
11:24 AM	3.34	157.32	711.36	218.54
11:25 AM	3.41	157.08	707.93	219.43
11:26 AM	3.40	156.49	706.47	217.27
11:27 AM	3.38	155.49	709.94	210.64
11:28 AM	3.34	154.20	715.08	216.32
11:29 AM	3.33	153.80	717.68	209.21
11:30 AM	3.34	154.32	717.24	214.65
11:31 AM	3.33	154.83	717.89	223.29
11:32 AM	3.31	156.28	717.20	218.41
11:33 AM	3.26	159.09	716.66	219.55
11:34 AM	3.28	159.98	715.97	207.83
11:35 AM	3.28	158.57	713.34	214.24
11:36 AM	3.33	157.18	711.80	216.32
11:37 AM	3.34	156.57	711.68	219.53
11:38 AM	3.35	156.28	710.28	209.43
11:39 AM	3.37	155.78	709.83	210.39
11:40 AM	3.39	155.64	711.34	218.43
Average	3.33	155.87	713.28	215.27

Signature



Miss Katesarin Vorradetwittaya

Environmental Scientist

STAR PETROLEUM REFINING PUBLIC CO., LTD. EMISSION TEST RESULT

Date: May 19, 2023
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 : Fuel Gas

Run # : 2

Location : RFCCU

Finish time : 12:01 PM

Serial No.: 111117-2

Serial No.: 433

Serial No.: 060

Serial No.: 388

Test Operator : Song H.

Time, min	O ₂ (%)	NO _x (ppm)	SO ₂ (ppm)	CO (ppm)
11:41 AM	3.41	155.41	709.91	215.32
11:42 AM	3.38	155.68	708.29	213.51
11:43 AM	3.37	155.95	710.82	224.23
11:44 AM	3.40	155.53	713.38	218.38
11:45 AM	3.35	155.56	713.64	209.65
11:46 AM	3.28	157.53	714.96	210.43
11:47 AM	3.32	159.39	717.02	223.90
11:48 AM	3.34	158.83	718.26	218.60
11:49 AM	3.47	157.37	717.85	233.95
11:50 AM	3.50	156.43	715.73	227.10
11:51 AM	3.45	155.37	718.17	224.85
11:52 AM	3.41	154.38	721.94	209.37
11:53 AM	3.38	154.03	724.10	215.34
11:54 AM	3.38	153.65	725.57	209.48
11:55 AM	3.38	153.13	724.90	220.89
11:56 AM	3.40	153.12	725.13	214.23
11:57 AM	3.37	153.39	726.27	214.55
11:58 AM	3.37	153.39	727.40	221.31
11:59 AM	3.30	154.91	728.88	213.80
12:00 PM	3.26	157.53	728.39	213.05
12:01 PM	3.32	159.08	727.27	210.97
Average	3.37	155.70	719.90	217.28

Signature



Miss Katesarin Vorradetwittaya

Environmental Scientist

STAR PETROLEUM REFINING PUBLIC CO., LTD. EMISSION TEST RESULT

Date: May 19, 2023
Start time: 12:02 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 : Fuel Gas

Run # : 3

Location : RFCCU

Finish time : 12:22 PM

Serial No.: 111117-2

Serial No.: 433

Serial No.: 060

Serial No.: 388

Test Operator : Song H.

Time, min	O ₂ (%)	NO _x (ppm)	SO ₂ (ppm)	CO (ppm)
12:02 PM	3.32	158.35	723.35	221.94
12:03 PM	3.30	156.61	723.42	223.82
12:04 PM	3.30	155.87	722.70	215.94
12:05 PM	3.32	155.41	720.49	228.46
12:06 PM	3.34	155.35	720.00	221.99
12:07 PM	3.33	155.50	720.01	216.44
12:08 PM	3.35	155.23	718.80	223.21
12:09 PM	3.35	155.24	718.45	222.62
12:10 PM	3.34	154.86	718.17	210.42
12:11 PM	3.38	154.51	718.92	209.32
12:12 PM	3.39	154.47	719.02	215.14
12:13 PM	3.38	156.39	718.89	219.46
12:14 PM	3.36	158.53	719.72	208.42
12:15 PM	3.34	157.79	722.23	208.38
12:16 PM	3.36	155.95	723.90	213.32
12:17 PM	3.36	154.87	724.01	223.55
12:18 PM	3.39	154.57	723.61	222.72
12:19 PM	3.41	153.89	725.25	217.17
12:20 PM	3.36	152.96	727.51	224.72
12:21 PM	3.37	152.64	729.41	219.76
12:22 PM	3.35	152.62	731.78	220.68
Average	3.35	155.31	722.36	218.45

Signature



Miss Katesarin Vorradetwittaya

Environmental Scientist



บริษัท ซีคอต จำกัด

SECOT CO., LTD.

239 ถนนริมคลองประปา แขวงบางซื่อ เขตบางซื่อ กรุงเทพฯ 10800

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STACK EMISSION ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REFERENCE NO.	: Refinery-223003-COA-Stk/PM
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING DATE	: 17/05/2023
RECEIVED DATE	: 22/05/2023	ANALYTICAL DATE	: 24-25/05/2023
REPORT DATE	: 29/05/2023	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	: 10.0	m/s
Diameter	: 3.0	m	Flow rate ⁽¹⁾	: 2,435	Ncu.m/min
Temperature	: 187.8	°C	Excess Oxygen	: 3.2	%

PARAMETER	UNIT	RESULTS ⁽¹⁾		ASSIGNED VALUE ⁽²⁾	STANDARD ⁽³⁾	REFERENCE METHODS
		3.2 % O ₂	7 % O ₂			
Particulate Matter	mg/Ncu.m	1.4	1.1	60	60	US EPA Method 5

Phatchara Samanchan

(Miss Phatchara Samanchan)

Analyst

REG.NO.7-239-0-8183

Narisa Poowasanpetch

(Miss Narisa Poowasanpetch)

Technical Management Team

REG.NO.7-239-0-6419

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 CDU

STAR PETROLEUM REFINING PUBLIC CO., LTD.

May 17, 2023

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	3.19	3.15	15.99	15.98	12.51
2	3.22	3.17	16.10	16.09	12.61
3	3.32	3.26	15.73	15.72	12.39
Average	3.24	3.19	15.94	15.93	12.51

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	3.19	3.15	3.29	3.23	2.53
2	3.22	3.17	3.73	3.68	2.89
3	3.32	3.26	3.65	3.61	2.84
Average	3.24	3.19	3.56	3.51	2.75

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	3.19	3.15	1.45	1.42	1.11
2	3.22	3.17	1.53	1.50	1.18
3	3.32	3.26	1.47	1.43	1.13
Average	3.24	3.19	1.48	1.45	1.14

STAR PETROLEUM REFINING PUBLIC CO., LTD. EMISSION TEST RESULT

Run # : 1

Date: May 17, 2023 Location : CDU

Start time: 10:40 AM Finish time : 11:00 AM

O₂ instrument Model: AMI 70 Serial No.: 111117-2

NO_x instrument Model: TELEDYNE 200 EM Serial No.: 433

SO₂ instrument Model: API 100 AH Serial No.: 060

CO instrument Model: THERMO 48 C Serial No.: 388

Fuel Type : Natural Gas Test Operator : Song H.

Time, min	O ₂ (%)	NO _x (ppm)	SO ₂ (ppm)	CO (ppm)
10:40 AM	3.17	15.76	2.58	1.34
10:41 AM	3.24	15.89	2.72	1.34
10:42 AM	3.16	15.91	2.83	1.41
10:43 AM	3.19	15.78	2.98	1.44
10:44 AM	3.22	15.80	3.11	1.44
10:45 AM	3.32	16.09	3.24	1.44
10:46 AM	3.19	16.24	3.30	1.44
10:47 AM	3.23	16.26	3.39	1.44
10:48 AM	3.15	16.13	3.47	1.44
10:49 AM	3.22	16.05	3.55	1.44
10:50 AM	3.25	16.19	3.66	1.44
10:51 AM	3.28	16.16	3.28	1.44
10:52 AM	3.24	15.98	3.31	1.44
10:53 AM	3.15	15.87	3.36	1.44
10:54 AM	3.12	15.97	3.37	1.44
10:55 AM	3.06	16.00	3.38	1.47
10:56 AM	3.11	16.01	3.41	1.52
10:57 AM	3.12	16.06	3.44	1.54
10:58 AM	3.13	15.93	3.50	1.54
10:59 AM	3.23	15.80	3.62	1.54
11:00 AM	3.23	15.82	3.64	1.54
Average	3.19	15.99	3.29	1.45

Signature 
Miss Katesarin Vorradetwittaya
Environmental Scientist

STAR PETROLEUM REFINING PUBLIC CO., LTD. EMISSION TEST RESULT

Run # : 2

Date: May 17, 2023 Location : CDU

Start time: 11:01 AM Finish time : 11:21 AM

O₂ instrument Model: AMI 70 Serial No.: 111117-2

NO_x instrument Model: TELEDYNE 200 EM Serial No.: 433

SO₂ instrument Model: API 100 AH Serial No.: 060

CO instrument Model: THERMO 48 C Serial No.: 388

Fuel Type : Natural Gas Test Operator : Song H.

Time, min	O ₂ (%)	NO _x (ppm)	SO ₂ (ppm)	CO (ppm)
11:01 AM	3.34	16.07	3.60	1.54
11:02 AM	3.31	16.34	3.62	1.54
11:03 AM	3.22	16.24	3.62	1.54
11:04 AM	3.23	15.97	3.63	1.54
11:05 AM	3.19	15.91	3.62	1.54
11:06 AM	3.11	16.04	3.66	1.54
11:07 AM	3.09	16.14	3.67	1.54
11:08 AM	3.09	16.11	3.68	1.54
11:09 AM	3.13	15.99	3.72	1.54
11:10 AM	3.14	15.95	3.71	1.54
11:11 AM	3.23	15.98	3.75	1.54
11:12 AM	3.35	15.98	3.76	1.54
11:13 AM	3.45	15.89	3.81	1.54
11:14 AM	3.46	15.90	3.84	1.48
11:15 AM	3.38	16.08	3.80	1.45
11:16 AM	3.36	16.24	3.79	1.52
11:17 AM	3.24	16.36	3.82	1.54
11:18 AM	3.08	16.28	3.79	1.54
11:19 AM	3.14	16.28	3.80	1.54
11:20 AM	3.06	16.26	3.84	1.54
11:21 AM	3.12	16.09	3.85	1.53
Average	3.22	16.10	3.73	1.53

Signature 
Miss Katesarin Vorradetwittaya
Environmental Scientist

STAR PETROLEUM REFINING PUBLIC CO., LTD. EMISSION TEST RESULT



บริษัท ซีคอต จำกัด

SECOT CO., LTD.

239 ถนนพหลโยธิน แขวงบางซื่อ เขตบางซื่อ กรุงเทพฯ 10800

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Run # : 3
 Date: May 17, 2023 Location : CDU
 Start time: 11:22 AM Finish time: 11:42 AM
 O₂ instrument Model: AMI 70 Serial No.: 111117-2
 NO_x instrument Model: TELEDYNE 200 EM Serial No.: 433
 SO₂ instrument Model: API 100 AH Serial No.: 060
 CO instrument Model: THERMO 48 C Serial No.: 388
 Fuel Type : Natural Gas Test Operator : Song H.

Time, min	O ₂ (%)	NO _x (ppm)	SO ₂ (ppm)	CO (ppm)
11:22 AM	3.20	16.22	3.88	1.54
11:23 AM	3.25	16.17	3.86	1.54
11:24 AM	3.29	15.85	3.82	1.47
11:25 AM	3.38	16.07	3.76	1.45
11:26 AM	3.36	16.32	3.71	1.53
11:27 AM	3.32	16.28	3.74	1.55
11:28 AM	3.27	16.43	3.74	1.53
11:29 AM	3.19	16.51	3.74	1.55
11:30 AM	3.23	16.51	3.77	1.55
11:31 AM	3.22	15.55	3.82	1.55
11:32 AM	3.28	15.87	3.78	1.55
11:33 AM	3.27	15.65	3.71	1.52
11:34 AM	3.28	15.61	3.67	1.45
11:35 AM	3.35	15.47	3.61	1.45
11:36 AM	3.39	15.26	3.55	1.45
11:37 AM	3.42	15.14	3.53	1.44
11:38 AM	3.43	15.07	3.48	1.35
11:39 AM	3.42	15.09	3.43	1.35
11:40 AM	3.40	15.08	3.38	1.35
11:41 AM	3.35	15.04	3.33	1.35
11:42 AM	3.32	15.04	3.29	1.35
Average	3.32	15.73	3.65	1.47

Signature

Miss Katesarin Vorradetwittaya

Environmental Scientist

STACK EMISSION ANALYSIS REPORT

CLIENT NAME : Star Petroleum Refining Public Co., Ltd. REFERENCE NO. : Refinery-223003-COA-Stk/PM
 SAMPLING BY : SECOT Co., Ltd. SAMPLING DATE : 23/05/2023
 RECEIVED DATE : 24/05/2023 ANALYTICAL DATE : 24-25/05/2023
 REPORT DATE : 29/05/2023 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 : 11.9 m/s
 Diameter : 2.0 m Flow rate⁽¹⁾ : 1,243 Ncu.m/min
 Temperature : 197.8 °C Excess Oxygen : 3.8 %

PARAMETER	UNIT	RESULTS ⁽¹⁾		ASSIGNED VALUE ⁽²⁾	STANDARD ⁽³⁾	REFERENCE METHODS
		3.8 % O ₂	7 % O ₂			
Particulate Matter	mg/Ncu.m	4.4	3.6	60	60	US EPA Method 5

Phatchara Samanchan

(Miss Phatchara Samanchan)

Analyst

REG.NO. 7-239-ท-8183

(Miss Narisa Poowasanpetch)

Technical Management Team

REG.NO. 7-239-ท-6419

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).

The Monitoring Result of Emission Concentration
VDU
STAR PETROLEUM REFINING PUBLIC CO., LTD.
May 23, 2023

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	3.84	3.80	15.86	15.86	12.89
2	3.92	3.87	15.79	15.79	12.89
3	3.87	3.81	15.67	15.66	12.74
Average	3.87	3.83	15.78	15.77	12.84

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	3.84	3.80	5.02	4.97	4.04
2	3.92	3.87	5.32	5.28	4.31
3	3.87	3.81	5.30	5.27	4.29
Average	3.87	3.83	5.21	5.17	4.21

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	3.84	3.80	0.63	0.60	0.49
2	3.92	3.87	0.63	0.60	0.49
3	3.87	3.81	0.63	0.60	0.49
Average	3.87	3.83	0.63	0.60	0.49

STAR PETROLEUM REFINING PUBLIC CO., LTD.
EMISSION TEST RESULT

Date: May 23, 2023
Start time: 2:00 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 : VDU
Finish time : 2:20 PM
Serial No.: 111117/2
Serial No.: 433
Serial No.: 060
Serial No.: 388
Test Operator : Song H.

Time, min	O ₂ (%)	NO _x (ppm)	SO ₂ (ppm)	CO (ppm)
2:00 PM	3.84	15.80	5.25	0.63
2:01 PM	3.77	15.80	5.12	0.63
2:02 PM	3.75	15.80	5.02	0.63
2:03 PM	3.78	15.80	4.90	0.63
2:04 PM	3.79	15.82	4.91	0.63
2:05 PM	3.80	15.79	4.91	0.63
2:06 PM	3.86	15.75	4.91	0.63
2:07 PM	3.84	15.77	4.92	0.63
2:08 PM	3.82	15.82	4.97	0.63
2:09 PM	3.79	15.85	4.97	0.63
2:10 PM	3.80	15.84	4.98	0.63
2:11 PM	3.85	15.84	4.97	0.63
2:12 PM	3.87	15.88	5.01	0.63
2:13 PM	3.88	15.99	5.03	0.63
2:14 PM	3.89	16.03	5.03	0.63
2:15 PM	3.92	16.01	4.98	0.63
2:16 PM	3.90	15.96	5.02	0.63
2:17 PM	3.83	15.94	5.05	0.63
2:18 PM	3.86	15.93	5.13	0.63
2:19 PM	3.85	15.85	5.18	0.63
2:20 PM	3.85	15.80	5.11	0.63
Average	3.84	15.86	5.02	0.63

Signature



Miss Katesarin Vorradetwittaya
 Environmental Scientist

STAR PETROLEUM REFINING PUBLIC CO., LTD. EMISSION TEST RESULT

Run # : 2
Date: May 23, 2023 **Location :** VDU
Start time: 2:21 PM **Finish time :** 2:41 PM
O₂ instrument Model: AMI 70 **Serial No.:** 111117/2
NO_x instrument Model: TELEDYNE 200 EM **Serial No.:** 433
SO₂ instrument Model: API 100 AH **Serial No.:** 060
CO instrument Model: THERMO 48 C **Serial No.:** 388
Fuel Type : Natural Gas **Test Operator :** Song H.

Time, min	O ₂ (%)	NO _x (ppm)	SO ₂ (ppm)	CO (ppm)
2:21 PM	3.90	15.71	5.08	0.63
2:22 PM	3.90	15.73	5.12	0.63
2:23 PM	3.87	15.73	5.13	0.63
2:24 PM	3.90	15.74	5.21	0.63
2:25 PM	3.90	15.80	5.26	0.63
2:26 PM	3.93	15.82	5.30	0.63
2:27 PM	3.91	15.78	5.31	0.63
2:28 PM	3.92	15.79	5.35	0.63
2:29 PM	3.95	15.88	5.41	0.63
2:30 PM	3.96	15.92	5.39	0.63
2:31 PM	3.98	15.94	5.36	0.63
2:32 PM	3.97	15.92	5.31	0.63
2:33 PM	3.94	15.88	5.35	0.63
2:34 PM	3.92	15.87	5.39	0.63
2:35 PM	3.93	15.85	5.40	0.63
2:36 PM	3.92	15.82	5.37	0.63
2:37 PM	3.90	15.78	5.42	0.63
2:38 PM	3.88	15.73	5.41	0.63
2:39 PM	3.88	15.65	5.39	0.63
2:40 PM	3.93	15.63	5.37	0.63
2:41 PM	3.93	15.67	5.38	0.63
Average	3.92	15.79	5.32	0.63

Signature



Miss Katesarin Vorradetwittaya
Environmental Scientist

STAR PETROLEUM REFINING PUBLIC CO., LTD. EMISSION TEST RESULT

Run # : 3
Date: May 23, 2023 **Location :** VDU
Start time: 2:42 PM **Finish time :** 3:02 PM
O₂ instrument Model: AMI 70 **Serial No.:** 111117/2
NO_x instrument Model: TELEDYNE 200 EM **Serial No.:** 433
SO₂ instrument Model: API 100 AH **Serial No.:** 060
CO instrument Model: THERMO 48 C **Serial No.:** 388
Fuel Type : Natural Gas **Test Operator :** Song H.

Time, min	O ₂ (%)	NO _x (ppm)	SO ₂ (ppm)	CO (ppm)
2:42 PM	3.90	15.70	5.36	0.63
2:43 PM	3.87	15.67	5.39	0.63
2:44 PM	3.89	15.60	5.33	0.63
2:45 PM	3.90	15.61	5.32	0.63
2:46 PM	3.92	15.65	5.29	0.63
2:47 PM	3.92	15.70	5.29	0.63
2:48 PM	3.92	15.73	5.30	0.63
2:49 PM	3.90	15.74	5.29	0.63
2:50 PM	3.90	15.67	5.26	0.63
2:51 PM	3.89	15.62	5.33	0.63
2:52 PM	3.86	15.65	5.25	0.63
2:53 PM	3.84	15.66	5.24	0.63
2:54 PM	3.87	15.61	5.27	0.63
2:55 PM	3.81	15.62	5.26	0.63
2:56 PM	3.82	15.60	5.24	0.63
2:57 PM	3.87	15.63	5.19	0.63
2:58 PM	3.90	15.70	5.21	0.63
2:59 PM	3.88	15.70	5.22	0.63
3:00 PM	3.83	15.63	5.24	0.63
3:01 PM	3.79	15.80	5.57	0.63
3:02 PM	3.78	15.83	5.48	0.63
Average	3.87	15.67	5.30	0.63

Signature



Miss Katesarin Vorradetwittaya
Environmental Scientist



บริษัท ซีคอต จำกัด
SECOT CO., LTD.

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STACK EMISSION ANALYSIS REPORT

CLIENT NAME : Star Petroleum Refining Public Co., Ltd. REFERENCE NO. : Refinery-223003-COA-Stk/PM
SAMPLING BY : SECOT Co., Ltd. SAMPLING DATE : 23/05/2023
RECEIVED DATE : 24/05/2023 ANALYTICAL DATE : 24-25/05/2023
REPORT DATE : 29/05/2023 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 : 8.2 m/s
Diameter : 3.1 m Flow rate ⁽¹⁾ : 2,009 Ncu.m/min
Temperature : 212.3 °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	5.6	4.5	60	60	US EPA Method 5

Phatchara Samanchan

(Miss Phatchara Samanchan)

Analyst

REG.NO. 2-239-ท-8183

Miss Narisa Poowasanpetch

(Miss Narisa Poowasanpetch)

Technical Management Team

REG.NO. 2-239-ท-6419

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 NHTU STAR PETROLEUM REFINING PUBLIC CO., LTD. May 23, 2023

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	3.56	3.52	32.23	32.26	25.80
2	3.55	3.51	31.83	31.85	25.46
3	3.54	3.51	31.77	31.78	25.40
Average	3.55	3.51	31.94	31.96	25.55

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	3.56	3.52	2.45	2.39	1.91
2	3.55	3.51	2.70	2.64	2.11
3	3.54	3.51	2.80	2.74	2.19
Average	3.55	3.51	2.65	2.59	2.07

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	3.56	3.52	0.21	0.17	0.14
2	3.55	3.51	0.22	0.18	0.14
3	3.54	3.51	0.23	0.20	0.16
Average	3.55	3.51	0.22	0.18	0.15

STAR PETROLEUM REFINING PUBLIC CO., LTD. EMISSION TEST RESULT

Run # : 1
Date: May 23, 2023 **Location :** NHTU
Start time: 10:30 AM **Finish time :** 10:50 AM
O₂ instrument Model: AMI 70 **Serial No.:** 111117-2
NO_x instrument Model: TELEDYNE 200 EM **Serial No.:** 433
SO₂ instrument Model: API 100 AH **Serial No.:** 060
CO instrument Model: THERMO 48 C **Serial No.:** 388
Fuel Type : Natural Gas **Test Operator :** Song H.

Time, min	O ₂ (%)	NO _x (ppm)	SO ₂ (ppm)	CO (ppm)
10:30 AM	3.53	32.53	2.70	0.21
10:31 AM	3.57	32.46	2.61	0.21
10:32 AM	3.50	32.40	2.50	0.21
10:33 AM	3.56	32.41	2.44	0.21
10:34 AM	3.59	32.40	2.38	0.20
10:35 AM	3.53	32.47	2.33	0.20
10:36 AM	3.65	32.42	2.35	0.20
10:37 AM	3.61	32.36	2.31	0.20
10:38 AM	3.62	32.35	2.32	0.21
10:39 AM	3.59	32.33	2.31	0.21
10:40 AM	3.56	32.26	2.34	0.21
10:41 AM	3.56	32.15	2.37	0.21
10:42 AM	3.43	32.18	2.38	0.21
10:43 AM	3.48	32.06	2.38	0.21
10:44 AM	3.58	31.87	2.44	0.21
10:45 AM	3.54	31.87	2.48	0.21
10:46 AM	3.48	32.00	2.46	0.21
10:47 AM	3.57	32.00	2.49	0.21
10:48 AM	3.58	32.03	2.56	0.21
10:49 AM	3.59	32.12	2.60	0.21
10:50 AM	3.61	32.08	2.62	0.21
Average	3.56	32.23	2.45	0.21

Signature



Miss Katesarin Vorradetwittaya
Environmental Scientist

STAR PETROLEUM REFINING PUBLIC CO., LTD. EMISSION TEST RESULT

Run # : 2
Date: May 23, 2023 **Location :** NHTU
Start time: 10:51 AM **Finish time :** 11:11 AM
O₂ instrument Model: AMI 70 **Serial No.:** 111117-2
NO_x instrument Model: TELEDYNE 200 EM **Serial No.:** 433
SO₂ instrument Model: API 100 AH **Serial No.:** 060
CO instrument Model: THERMO 48 C **Serial No.:** 388
Fuel Type : Natural Gas **Test Operator :** Song H.

Time, min	O ₂ (%)	NO _x (ppm)	SO ₂ (ppm)	CO (ppm)
10:51 AM	3.52	32.01	2.62	0.21
10:52 AM	3.52	31.95	2.66	0.21
10:53 AM	3.58	31.88	2.69	0.21
10:54 AM	3.54	31.85	2.67	0.21
10:55 AM	3.59	31.93	2.67	0.21
10:56 AM	3.60	31.94	2.68	0.21
10:57 AM	3.62	31.86	2.66	0.21
10:58 AM	3.69	31.88	2.67	0.21
10:59 AM	3.56	31.87	2.68	0.21
11:00 AM	3.50	31.87	2.68	0.22
11:01 AM	3.54	31.81	2.72	0.22
11:02 AM	3.59	31.74	2.71	0.22
11:03 AM	3.58	31.72	2.72	0.22
11:04 AM	3.54	31.74	2.72	0.22
11:05 AM	3.57	31.77	2.70	0.22
11:06 AM	3.54	31.87	2.73	0.22
11:07 AM	3.52	31.91	2.75	0.22
11:08 AM	3.45	31.77	2.73	0.22
11:09 AM	3.46	31.63	2.75	0.22
11:10 AM	3.52	31.60	2.74	0.22
11:11 AM	3.53	31.78	2.74	0.22
Average	3.55	31.83	2.70	0.22

Signature



Miss Katesarin Vorradetwittaya
Environmental Scientist

STAR PETROLEUM REFINING PUBLIC CO., LTD.

EMISSION TEST RESULT

Run # : 3

Date: May 23, 2023 Location : NHTU

Start time: 11:12 AM Finish time: 11:32 AM

O₂ instrument Model: AMI 70 Serial No.: 111117-2

NO_x instrument Model: TELEDYNE 200 EM Serial No.: 433

SO₂ instrument Model: API 100 AH Serial No.: 060

CO instrument Model: THERMO 48 C Serial No.: 388

Fuel Type : Natural Gas Test Operator : Song H.

Time, min	O ₂ (%)	NO _x (ppm)	SO ₂ (ppm)	CO (ppm)
11:12 AM	3.50	31.81	2.73	0.22
11:13 AM	3.49	31.78	2.71	0.23
11:14 AM	3.45	31.76	2.71	0.23
11:15 AM	3.52	31.73	2.73	0.23
11:16 AM	3.57	31.75	2.75	0.23
11:17 AM	3.56	31.85	2.78	0.23
11:18 AM	3.55	31.86	2.79	0.23
11:19 AM	3.51	31.82	2.73	0.23
11:20 AM	3.51	31.78	2.72	0.23
11:21 AM	3.56	31.73	2.69	0.23
11:22 AM	3.58	31.76	2.67	0.22
11:23 AM	3.62	31.76	2.76	0.23
11:24 AM	3.52	31.76	2.77	0.22
11:25 AM	3.57	31.80	2.89	0.22
11:26 AM	3.58	31.73	2.86	0.22
11:27 AM	3.60	31.65	2.88	0.22
11:28 AM	3.60	31.67	2.89	0.22
11:29 AM	3.59	31.82	2.88	0.22
11:30 AM	3.55	31.85	2.92	0.22
11:31 AM	3.52	31.74	2.92	0.23
11:32 AM	3.43	31.66	2.92	0.22
Average	3.54	31.77	2.80	0.23

Signature 

Miss Katesarin Vorradetwittaya
Environmental Scientist



บริษัท ซีคอต จำกัด

SECOT CO., LTD.

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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-223003-COA-Stk/PM

SAMPLING BY : SECOT Co., Ltd. SAMPLING DATE : 19/05/2023

RECEIVED DATE : 22/05/2023 ANALYTICAL DATE : 24-25/05/2023

REPORT DATE : 29/05/2023 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 : 9.4 m/s

Diameter : 1.6 m Flow rate ⁽¹⁾ : 413.4 Ncu.m/min

Temperature : 448.3 °C Excess Oxygen : 5.8 %

PARAMETER	UNIT	RESULTS ⁽¹⁾		ASSIGNED VALUE ⁽²⁾	STANDARD ⁽³⁾	REFERENCE METHODS
		5.8 % O ₂	7 % O ₂			
Particulate Matter	mg/Ncu.m	10.1	9.3	60	60	US EPA Method 5

Phatchara Samanchan
(Miss Phatchara Samanchan)

Analyst

REG.NO.7-239-0-8183

Narisa Poowasanpetch
(Miss Narisa Poowasanpetch)

Technical Management Team

REG.NO.7-239-0-6419

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).

The Monitoring Result of Emission Concentration
DHTU
STAR PETROLEUM REFINING PUBLIC CO., LTD.
May 19, 2023

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	5.47	5.44	42.23	42.20	37.94
2	5.79	5.78	41.20	41.17	37.85
3	6.02	6.02	40.31	40.28	37.63
Average	5.76	5.75	41.25	41.22	37.81

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	5.47	5.44	0.68	0.61	0.55
2	5.79	5.78	0.37	0.29	0.27
3	6.02	6.02	0.17	0.09	0.08
Average	5.76	5.75	0.41	0.33	0.30

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	5.47	5.44	0.11	0.05	0.04
2	5.79	5.78	0.22	0.14	0.13
3	6.02	6.02	0.35	0.26	0.24
Average	5.76	5.75	0.22	0.15	0.14

STAR PETROLEUM REFINING PUBLIC CO., LTD.
EMISSION TEST RESULT

Run # : 1
Date: May 19, 2023
Location : DHTU
Start time: 10:50 AM
Finish time : 11:10 AM
O₂ instrument Model: AMI 70
Serial No.: 161212-14
NO_x instrument Model: TELEDYNE 200 EM
Serial No.: 435
SO₂ instrument Model: API 100 AH
Serial No.: 058
CO instrument Model: API 300 A
Serial No.: 1070
Fuel Type : Natural Gas
Test Operator : Kittipong T.

Time, min	O ₂ (%)	NO _x (ppm)	SO ₂ (ppm)	CO (ppm)
10:50 AM	4.85	41.97	0.76	0.11
10:51 AM	4.99	41.65	0.73	0.19
10:52 AM	5.10	41.88	0.73	0.20
10:53 AM	5.16	42.31	0.69	0.13
10:54 AM	5.12	42.62	0.73	0.02
10:55 AM	5.29	42.63	0.78	0.10
10:56 AM	5.65	42.56	0.81	0.17
10:57 AM	5.62	42.55	0.82	0.21
10:58 AM	5.60	42.46	0.74	0.20
10:59 AM	5.21	42.45	0.68	0.20
11:00 AM	5.16	42.39	0.67	0.14
11:01 AM	5.57	42.22	0.72	0.09
11:02 AM	5.58	42.21	0.71	0.04
11:03 AM	5.59	42.37	0.64	0.03
11:04 AM	5.68	42.35	0.70	0.03
11:05 AM	5.72	41.84	0.67	0.03
11:06 AM	5.79	41.64	0.61	0.03
11:07 AM	5.78	42.13	0.58	0.08
11:08 AM	5.72	42.42	0.56	0.09
11:09 AM	5.85	42.21	0.49	0.09
11:10 AM	5.84	42.05	0.44	0.09
Average	5.47	42.23	0.68	0.11

Signature



Miss Katesarin Vorradetwittaya

Environmental Scientist

STAR PETROLEUM REFINING PUBLIC CO., LTD. EMISSION TEST RESULT

Run # : 2
Date: May 19, 2023 **Location :** DHTU
Start time: 11:11 AM **Finish time :** 11:31 AM
O₂ instrument Model: AMI 70 **Serial No.:** 161212-14
NO_x instrument Model: TELEDYNE 200 EM **Serial No.:** 435
SO₂ instrument Model: API 100 AH **Serial No.:** 058
CO instrument Model: API 300 A **Serial No.:** 1070
Fuel Type : Natural Gas **Test Operator :** Kittipong T.

Time, min	O ₂ (%)	NO _x (ppm)	SO ₂ (ppm)	CO (ppm)
11:11 AM	5.75	41.99	0.45	0.09
11:12 AM	5.62	41.90	0.47	0.12
11:13 AM	5.90	41.68	0.45	0.14
11:14 AM	5.82	41.54	0.38	0.14
11:15 AM	5.71	41.66	0.44	0.14
11:16 AM	5.75	41.61	0.38	0.14
11:17 AM	5.65	41.58	0.36	0.16
11:18 AM	5.61	41.60	0.37	0.20
11:19 AM	5.55	41.45	0.35	0.20
11:20 AM	5.39	41.21	0.38	0.22
11:21 AM	5.63	41.15	0.42	0.26
11:22 AM	5.92	41.09	0.36	0.26
11:23 AM	5.93	40.99	0.36	0.26
11:24 AM	6.06	40.88	0.38	0.26
11:25 AM	6.00	40.88	0.36	0.26
11:26 AM	5.76	40.85	0.30	0.26
11:27 AM	5.72	40.78	0.35	0.26
11:28 AM	5.87	40.58	0.28	0.28
11:29 AM	6.00	40.54	0.36	0.31
11:30 AM	5.94	40.63	0.29	0.31
11:31 AM	5.97	40.51	0.27	0.31
Average	5.79	41.20	0.37	0.22

Signature



Miss Katesarin Vorradetwittaya
Environmental Scientist

STAR PETROLEUM REFINING PUBLIC CO., LTD. EMISSION TEST RESULT

Run # : 3
Date: May 19, 2023 **Location :** DHTU
Start time: 11:32 AM **Finish time :** 11:52 AM
O₂ instrument Model: AMI 70 **Serial No.:** 161212-14
NO_x instrument Model: TELEDYNE 200 EM **Serial No.:** 435
SO₂ instrument Model: API 100 AH **Serial No.:** 058
CO instrument Model: API 300 A **Serial No.:** 1070
Fuel Type : Natural Gas **Test Operator :** Kittipong T.

Time, min	O ₂ (%)	NO _x (ppm)	SO ₂ (ppm)	CO (ppm)
11:32 AM	5.93	40.06	0.26	0.31
11:33 AM	6.11	39.92	0.30	0.31
11:34 AM	5.93	40.23	0.22	0.31
11:35 AM	5.94	40.42	0.24	0.32
11:36 AM	5.94	40.42	0.18	0.37
11:37 AM	5.97	40.57	0.17	0.36
11:38 AM	5.97	40.57	0.19	0.32
11:39 AM	6.03	40.61	0.16	0.31
11:40 AM	6.05	40.66	0.17	0.31
11:41 AM	6.03	40.76	0.17	0.32
11:42 AM	6.00	40.53	0.15	0.36
11:43 AM	6.11	40.17	0.17	0.37
11:44 AM	6.04	40.25	0.18	0.37
11:45 AM	6.11	40.31	0.11	0.37
11:46 AM	6.14	40.25	0.10	0.37
11:47 AM	6.05	40.29	0.13	0.37
11:48 AM	5.99	40.14	0.13	0.37
11:49 AM	6.05	39.87	0.16	0.37
11:50 AM	6.00	39.96	0.16	0.37
11:51 AM	6.07	40.19	0.14	0.37
11:52 AM	6.05	40.31	0.15	0.37
Average	6.02	40.31	0.17	0.35

Signature



Miss Katesarin Vorradetwittaya
Environmental Scientist



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SECOT CO., LTD.

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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-223003-COA-Stk/PM
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING DATE	: 19/05/2023
RECEIVED DATE	: 22/05/2023	ANALYTICAL DATE	: 24-25/05/2023
REPORT DATE	: 29/05/2023	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	: 8.1	m/s
Diameter	: 1.6	m	Flow rate ⁽¹⁾	: 386.3	Ncu.m/min
Temperature	: 399.5	°C	Excess Oxygen	: 5.9	%

PARAMETER	UNIT	RESULTS ⁽¹⁾		ASSIGNED VALUE ⁽²⁾	STANDARD ⁽³⁾	REFERENCE METHODS
		5.9 % O ₂	7 % O ₂			
Particulate Matter	mg/Ncu.m	3.9	3.6	60	60	US EPA Method 5

Phatchara Samanchan
(Miss Phatchara Samanchan)

Analyst

REG.NO.7-239-9-8183

Maia Poowasanpetch
(Miss Narisa Poowasanpetch)

Technical Management Team

REG.NO.7-239-9-6419

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 HVGO STAR PETROLEUM REFINING PUBLIC CO., LTD. May 19, 2023

Run Number	Oxygen content (%)		Oxide of Nitrogen (ppm)		
	RM Stack Gas Conc	Corrected Gas Conc	RM Stack Gas Conc	Corrected Gas Conc @Actual O ₂	Corrected Gas Conc @7% O ₂
1	5.73	5.75	53.53	53.51	49.09
2	6.04	6.05	54.54	54.52	51.03
3	5.91	5.90	54.04	54.02	50.06
Average	5.89	5.90	54.04	54.02	50.06

Run Number	Oxygen content (%)		Sulfur dioxide (ppm)		
	RM Stack Gas Conc	Corrected Gas Conc	RM Stack Gas Conc	Corrected Gas Conc @Actual O ₂	Corrected Gas Conc @7% O ₂
1	5.73	5.75	0.87	0.82	0.75
2	6.04	6.05	1.16	1.10	1.03
3	5.91	5.90	1.46	1.40	1.30
Average	5.89	5.90	1.16	1.11	1.03

Run Number	Oxygen content (%)		Carbonmonoxide (ppm)		
	RM Stack Gas Conc	Corrected Gas Conc	RM Stack Gas Conc	Corrected Gas Conc @Actual O ₂	Corrected Gas Conc @7% O ₂
1	5.73	5.75	0.89	0.85	0.78
2	6.04	6.05	0.86	0.81	0.76
3	5.91	5.90	0.89	0.82	0.76
Average	5.89	5.90	0.88	0.83	0.77

STAR PETROLEUM REFINING PUBLIC CO., LTD. EMISSION TEST RESULT

Run # : 1

Date: May 19, 2023

Location : HVGO

Start time: 10:50 AM

Finish time: 11:10 AM

O₂ instrument Model: AMI 70

Serial No.: 121121-10

NO_x instrument Model: API 200 AH

Serial No.: 441

SO₂ instrument Model: API 100 AH

Serial No.: 132

CO instrument Model: THERMO 48 C

Serial No.: 049

Fuel Type : Natural Gas

Test Operator : Kittipong T.

Time, min	O ₂ (%)	NO _x (ppm)	SO ₂ (ppm)	CO (ppm)
10:50 AM	5.41	52.37	0.63	0.89
10:51 AM	5.41	52.32	0.63	0.87
10:52 AM	5.39	52.27	0.80	0.87
10:53 AM	5.40	52.31	0.77	0.88
10:54 AM	5.51	52.81	0.91	0.88
10:55 AM	5.55	53.05	0.91	0.94
10:56 AM	5.66	52.92	0.91	0.88
10:57 AM	5.74	53.24	0.90	0.88
10:58 AM	5.81	53.40	0.90	0.84
10:59 AM	5.73	53.80	0.90	0.91
11:00 AM	5.65	53.73	0.90	0.88
11:01 AM	5.67	53.44	0.90	0.89
11:02 AM	5.92	53.39	0.90	0.88
11:03 AM	5.85	54.07	0.90	0.87
11:04 AM	5.94	54.12	0.90	0.94
11:05 AM	5.94	54.37	0.90	0.89
11:06 AM	5.87	54.41	0.90	0.88
11:07 AM	5.82	54.24	0.89	0.88
11:08 AM	5.92	54.35	0.89	0.88
11:09 AM	6.06	54.76	0.97	0.88
11:10 AM	6.05	54.84	0.92	0.88
Average	5.73	53.53	0.87	0.89

Signature 
Miss Katesarin Vorradetwittaya
Environmental Scientist

STAR PETROLEUM REFINING PUBLIC CO., LTD. EMISSION TEST RESULT

Run # : 2

Date: May 19, 2023

Location : HVGO

Start time: 11:11 AM

Finish time: 11:31 AM

O₂ instrument Model: AMI 70

Serial No.: 121121-10

NO_x instrument Model: API 200 AH

Serial No.: 441

SO₂ instrument Model: API 100 AH

Serial No.: 132

CO instrument Model: THERMO 48 C

Serial No.: 049

Fuel Type : Natural Gas

Test Operator : Kittipong T.

Time, min	O ₂ (%)	NO _x (ppm)	SO ₂ (ppm)	CO (ppm)
11:11 AM	6.10	54.84	1.04	0.86
11:12 AM	6.11	54.78	0.90	0.88
11:13 AM	6.03	54.72	0.97	0.84
11:14 AM	6.03	54.69	1.15	0.86
11:15 AM	5.97	54.66	0.95	0.86
11:16 AM	5.99	54.81	1.15	0.89
11:17 AM	6.01	54.74	1.20	0.87
11:18 AM	5.95	54.57	1.20	0.86
11:19 AM	5.88	54.60	1.21	0.87
11:20 AM	5.92	54.48	1.21	0.87
11:21 AM	5.80	54.20	1.21	0.87
11:22 AM	6.06	54.20	1.21	0.87
11:23 AM	6.22	54.71	1.21	0.84
11:24 AM	6.20	54.70	1.21	0.82
11:25 AM	6.15	54.64	1.21	0.87
11:26 AM	6.14	54.72	1.21	0.87
11:27 AM	5.98	54.49	1.21	0.87
11:28 AM	6.10	54.17	1.21	0.79
11:29 AM	6.10	54.26	1.22	0.86
11:30 AM	6.11	54.20	1.22	0.87
11:31 AM	6.09	54.26	1.22	0.87
Average	6.04	54.54	1.16	0.86

Signature 
Miss Katesarin Vorradetwittaya
Environmental Scientist

STAR PETROLEUM REFINING PUBLIC CO., LTD. EMISSION TEST RESULT



บริษัท ซีคอต จำกัด

SECOT CO., LTD.

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

Run # : 3

Date: May 19, 2023 Location : HVGO

Start time: 11:32 AM Finish time: 11:52 AM

O₂ instrument Model: AMI 70 Serial No.: 121121-10

NO_x instrument Model: API 200 AH Serial No.: 441

SO₂ instrument Model: API 100 AH Serial No.: 132

CO instrument Model: THERMO 48 C Serial No.: 049

Fuel Type : Natural Gas Test Operator : Kittipong T.

Time, min	O ₂ (%)	NO _x (ppm)	SO ₂ (ppm)	CO (ppm)
11:32 AM	6.02	54.20	1.22	0.87
11:33 AM	5.95	54.30	1.49	0.87
11:34 AM	6.03	54.14	1.49	0.87
11:35 AM	5.96	54.28	1.31	0.87
11:36 AM	6.03	54.50	1.35	0.87
11:37 AM	5.97	49.98	1.49	0.87
11:38 AM	5.81	54.36	1.49	0.89
11:39 AM	5.89	54.11	1.49	0.92
11:40 AM	5.94	54.38	1.49	0.87
11:41 AM	5.98	54.54	1.49	0.87
11:42 AM	6.01	54.56	1.50	0.87
11:43 AM	6.02	54.40	1.50	0.87
11:44 AM	6.08	54.36	1.50	0.90
11:45 AM	6.08	54.61	1.43	0.93
11:46 AM	5.84	54.59	1.50	0.95
11:47 AM	5.78	53.91	1.50	0.88
11:48 AM	5.78	53.67	1.49	0.90
11:49 AM	5.75	53.87	1.49	0.92
11:50 AM	5.77	53.93	1.49	0.89
11:51 AM	5.74	53.93	1.49	0.95
11:52 AM	5.70	54.22	1.49	0.90
Average	5.91	54.04	1.46	0.89

Signature

Miss Katesarin Vorradetwittaya
Environmental Scientist

STACK EMISSION ANALYSIS REPORT

CLIENT NAME : Star Petroleum Refining Public Co., Ltd. REFERENCE NO. : Refinery-223003-COA-Stk/PM

SAMPLING BY : SECOT Co., Ltd. SAMPLING DATE : 19/05/2023

RECEIVED DATE : 22/05/2023 ANALYTICAL DATE : 24-25/05/2023

REPORT DATE : 29/05/2023 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 : 5.1 m/s

Diameter : 0.86 m Flow rate ⁽¹⁾ : 93.5 Ncu.m/min

Temperature : 235.8 °C Excess Oxygen : 6.5 %

PARAMETER	UNIT	RESULTS ⁽¹⁾		ASSIGNED VALUE ⁽²⁾	STANDARD ⁽³⁾	REFERENCE METHODS
		6.5 % O ₂	7 % O ₂			
Particulate Matter	mg/Ncu.m	5.8	5.6	35	60	US EPA Method 5

Phatchara Samanchan
(Miss Phatchara Samanchan)

Analyst

REG.NO. 7-239-ท-8183

Narisra Poowasanpetch
(Miss Narisa Poowasanpetch)

Technical Management Team

REG.NO. 7-239-ท-6419

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).

The Monitoring Result of Emission Concentration
WCN-HTU
STAR PETROLEUM REFINING PUBLIC CO., LTD.
May 19, 2023

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	6.32	6.30	20.17	20.12	19.16
2	6.31	6.29	20.37	20.32	19.33
3	7.01	6.99	20.63	20.58	20.57
Average	6.55	6.53	20.39	20.34	19.67

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	6.32	6.30	2.14	2.08	1.98
2	6.31	6.29	2.83	2.77	2.64
3	7.01	6.99	2.78	2.72	2.72
Average	6.55	6.53	2.59	2.52	2.44

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	6.32	6.30	0.32	0.24	0.23
2	6.31	6.29	0.31	0.23	0.22
3	7.01	6.99	0.31	0.22	0.22
Average	6.55	6.53	0.31	0.23	0.22

STAR PETROLEUM REFINING PUBLIC CO., LTD.
EMISSION TEST RESULT

Run # : 1
Date: May 19, 2023
Location : WCN-HTU
Start time: 1:20 PM
Finish time: 1:40 PM
O₂ instrument Model: AMI 70
Serial No.: 121121-10
NO_x instrument Model: API 200 AH
Serial No.: 441
SO₂ instrument Model: API 100 AH
Serial No.: 132
CO instrument Model: THERMO 48 C
Serial No.: 049
Fuel Type : Natural Gas
Test Operator : Kittipong T.

Time, min	O ₂ (%)	NO _x (ppm)	SO ₂ (ppm)	CO (ppm)
1:20 PM	6.47	19.01	1.60	0.33
1:21 PM	6.53	19.25	1.60	0.31
1:22 PM	6.49	19.71	1.60	0.33
1:23 PM	6.46	19.98	1.67	0.32
1:24 PM	6.39	20.16	1.83	0.32
1:25 PM	6.27	20.14	1.87	0.32
1:26 PM	6.39	20.06	1.86	0.32
1:27 PM	6.39	20.31	2.01	0.32
1:28 PM	6.28	20.34	1.85	0.32
1:29 PM	6.37	20.28	1.95	0.31
1:30 PM	6.24	20.29	2.16	0.29
1:31 PM	6.19	20.30	2.30	0.31
1:32 PM	6.21	20.23	2.38	0.30
1:33 PM	6.19	20.31	2.40	0.32
1:34 PM	6.20	20.40	2.46	0.31
1:35 PM	6.31	20.34	2.46	0.31
1:36 PM	6.25	20.40	2.46	0.32
1:37 PM	6.36	20.56	2.48	0.31
1:38 PM	6.19	20.69	2.58	0.33
1:39 PM	6.29	20.36	2.71	0.32
1:40 PM	6.29	20.49	2.76	0.35
Average	6.32	20.17	2.14	0.32

Signature



Miss Katesarin Vorradetwittaya
Environmental Scientist

STAR PETROLEUM REFINING PUBLIC CO., LTD. EMISSION TEST RESULT

Run # : 2

Date: May 19, 2023 Location : WCN-HTU

Start time: 1:41 PM Finish time : 2:01 PM

O₂ instrument Model: AMI 70 Serial No.: 121121-10

NO_x instrument Model: API 200 AH Serial No.: 441

SO₂ instrument Model: API 100 AH Serial No.: 132

CO instrument Model: THERMO 48 C Serial No.: 049

Fuel Type : Natural Gas Test Operator : Kittipong T.

Time, min	O ₂ (%)	NO _x (ppm)	SO ₂ (ppm)	CO (ppm)
1:41 PM	6.22	20.46	2.76	0.31
1:42 PM	6.11	20.52	2.76	0.32
1:43 PM	6.23	20.46	2.76	0.31
1:44 PM	6.18	20.40	2.77	0.34
1:45 PM	6.34	20.47	2.76	0.29
1:46 PM	6.34	20.49	2.77	0.31
1:47 PM	6.36	20.33	2.88	0.31
1:48 PM	6.30	20.31	2.76	0.31
1:49 PM	6.26	20.32	2.81	0.30
1:50 PM	6.29	20.44	2.78	0.32
1:51 PM	6.34	20.34	2.87	0.30
1:52 PM	6.35	20.22	2.92	0.31
1:53 PM	6.33	20.32	2.75	0.30
1:54 PM	6.22	20.40	2.75	0.30
1:55 PM	6.29	20.36	2.97	0.32
1:56 PM	6.25	20.34	2.85	0.32
1:57 PM	6.39	20.25	2.87	0.31
1:58 PM	6.39	20.23	2.86	0.33
1:59 PM	6.46	20.45	2.92	0.32
2:00 PM	6.40	20.50	2.99	0.31
2:01 PM	6.49	20.24	2.94	0.31
Average	6.31	20.37	2.83	0.31

Signature 

Miss Katesarin Vorradetwittaya
Environmental Scientist

STAR PETROLEUM REFINING PUBLIC CO., LTD. EMISSION TEST RESULT

Run # : 3

Date: May 19, 2023 Location : WCN-HTU

Start time: 2:02 PM Finish time : 2:22 PM

O₂ instrument Model: AMI 70 Serial No.: 121121-10

NO_x instrument Model: API 200 AH Serial No.: 441

SO₂ instrument Model: API 100 AH Serial No.: 132

CO instrument Model: THERMO 48 C Serial No.: 049

Fuel Type : Natural Gas Test Operator : Kittipong T.

Time, min	O ₂ (%)	NO _x (ppm)	SO ₂ (ppm)	CO (ppm)
2:02 PM	6.53	20.50	3.00	0.31
2:03 PM	6.47	20.58	3.00	0.31
2:04 PM	6.58	20.27	2.99	0.31
2:05 PM	6.59	20.34	2.99	0.31
2:06 PM	6.69	20.43	2.75	0.31
2:07 PM	6.77	20.63	2.79	0.31
2:08 PM	6.85	20.69	2.79	0.31
2:09 PM	6.86	20.64	2.81	0.31
2:10 PM	6.88	20.67	2.97	0.30
2:11 PM	6.96	20.59	2.82	0.30
2:12 PM	7.05	20.68	2.72	0.30
2:13 PM	7.16	20.66	2.67	0.30
2:14 PM	7.24	20.61	2.74	0.30
2:15 PM	7.31	20.69	2.67	0.30
2:16 PM	7.25	20.66	2.74	0.30
2:17 PM	7.24	20.53	2.67	0.30
2:18 PM	7.27	20.84	2.67	0.30
2:19 PM	7.40	20.76	2.68	0.30
2:20 PM	7.36	20.80	2.69	0.31
2:21 PM	7.39	20.79	2.69	0.31
2:22 PM	7.42	20.85	2.63	0.31
Average	7.01	20.63	2.78	0.31

Signature 

Miss Katesarin Vorradetwittaya
Environmental Scientist



บริษัท ซีคอต จำกัด
SECOT CO., LTD.

239 ถนนริมคลองประปา แขวงบางซื่อ เขตบางซื่อ กรุงเทพฯ 10800

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STACK EMISSION ANALYSIS REPORT

CLIENT NAME : Star Petroleum Refining Public Co., Ltd. REFERENCE NO. : Refinery-223003-COA-Stk/PM
SAMPLING BY : SECOT Co., Ltd. SAMPLING DATE : 18/05/2023
RECEIVED DATE : 22/05/2023 ANALYTICAL DATE : 24-25/05/2023
REPORT DATE : 29/05/2023 SAMPLE CONDITION : Normal
STACK LOCATION : Boiler#1 Stack OPERATOR : Mr. Kittipong Thakoengsuk
SOURCE DESCRIPTION : Combustion FUEL TYPE : Natural Gas + Refinery Fuel Gas

STACK DESCRIPTION

Height : 32.4 m Gas Velocity : 12.3 m/s
Diameter : 1.5 m Flow rate ⁽¹⁾ : 773.9 Ncu.m/min
Temperature : 173.7 °C Excess Oxygen : 3.9 %

PARAMETER	UNIT	RESULTS ⁽¹⁾		ASSIGNED VALUE ⁽²⁾	STANDARD ⁽³⁾	REFERENCE METHODS
		3 % O ₂	7 % O ₂			
Particulate Matter	mg/Ncu.m	1.5	1.2	60	60	US EPA Method 5

Phatchara Samanchan
(Miss Phatchara Samanchan)

Analyst

REG.NO. 2-239-0-8183

Narisa Poowasanpetch
(Miss Narisa Poowasanpetch)

Technical Management Team

REG.NO. 2-239-0-6419

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 1 STAR PETROLEUM REFINING PUBLIC CO., LTD. May 18, 2023

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	4.03	3.96	98.10	98.11	80.50
2	3.93	3.86	102.19	102.20	83.37
3	3.86	3.78	107.46	107.48	87.26
Average	3.94	3.87	102.58	102.60	83.72

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	4.03	3.96	0.87	0.84	0.69
2	3.93	3.86	0.87	0.83	0.68
3	3.86	3.78	0.87	0.82	0.67
Average	3.94	3.87	0.87	0.83	0.68

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	4.03	3.96	0.69	0.64	0.53
2	3.93	3.86	0.66	0.61	0.50
3	3.86	3.78	0.81	0.77	0.63
Average	3.94	3.87	0.72	0.67	0.55

STAR PETROLEUM REFINING PUBLIC CO., LTD. EMISSION TEST RESULT

Run # : 1

Date: May 18, 2023 Location : Boiler 1

Start time: 11:00 AM Finish time : 11:20 AM

O₂ instrument Model: AMI 70 Serial No.: 111117-2

NO_x instrument Model: TELEDYNE 200 EM Serial No.: 433

SO₂ instrument Model: API 100 AH Serial No.: 060

CO instrument Model: THERMO 48 C Serial No.: 388

Fuel Type : Natural Gas Test Operator : Song H.

Time, min	O ₂ (%)	NO _x (ppm)	SO ₂ (ppm)	CO (ppm)
11:00 AM	3.98	95.65	0.87	0.85
11:01 AM	4.01	96.32	0.87	0.73
11:02 AM	4.13	95.67	0.87	0.48
11:03 AM	4.08	98.56	0.87	0.46
11:04 AM	4.15	99.48	0.87	1.01
11:05 AM	4.17	102.81	0.87	0.76
11:06 AM	3.94	98.56	0.87	0.76
11:07 AM	3.72	97.78	0.87	1.28
11:08 AM	4.36	98.63	0.87	0.90
11:09 AM	4.07	97.46	0.87	0.57
11:10 AM	3.89	96.87	0.87	0.69
11:11 AM	4.29	97.84	0.87	0.70
11:12 AM	4.35	98.58	0.87	0.09
11:13 AM	3.65	97.40	0.87	0.01
11:14 AM	3.78	95.48	0.87	0.49
11:15 AM	4.31	99.27	0.87	0.54
11:16 AM	4.15	98.43	0.87	0.46
11:17 AM	3.55	98.37	0.87	0.92
11:18 AM	4.05	98.98	0.87	0.92
11:19 AM	4.24	99.03	0.87	0.92
11:20 AM	3.79	98.95	0.87	0.92
Average	4.03	98.10	0.87	0.69

Signature 

Miss Katesarin Vorradetwittaya
Environmental Scientist

STAR PETROLEUM REFINING PUBLIC CO., LTD. EMISSION TEST RESULT

Run # : 2

Date: May 18, 2023 Location : Boiler 1

Start time: 11:21 AM Finish time : 11:41 AM

O₂ instrument Model: AMI 70 Serial No.: 111117-2

NO_x instrument Model: TELEDYNE 200 EM Serial No.: 433

SO₂ instrument Model: API 100 AH Serial No.: 060

CO instrument Model: THERMO 48 C Serial No.: 388

Fuel Type : Natural Gas Test Operator : Song H.

Time, min	O ₂ (%)	NO _x (ppm)	SO ₂ (ppm)	CO (ppm)
11:21 AM	3.72	99.59	0.87	0.92
11:22 AM	4.31	99.80	0.87	0.92
11:23 AM	3.99	99.35	0.87	0.78
11:24 AM	3.71	99.42	0.87	1.11
11:25 AM	4.13	99.80	0.87	1.33
11:26 AM	4.46	99.47	0.87	0.71
11:27 AM	3.94	99.97	0.87	0.40
11:28 AM	4.00	99.27	0.87	0.54
11:29 AM	4.11	100.67	0.87	0.27
11:30 AM	4.21	101.26	0.87	0.02
11:31 AM	4.11	102.28	0.87	0.05
11:32 AM	4.08	102.39	0.87	0.06
11:33 AM	4.00	103.24	0.87	0.15
11:34 AM	3.71	104.45	0.87	0.82
11:35 AM	3.33	104.64	0.87	0.82
11:36 AM	3.55	104.33	0.87	0.82
11:37 AM	3.89	103.88	0.87	0.82
11:38 AM	3.77	104.64	0.87	0.82
11:39 AM	3.77	105.87	0.87	0.82
11:40 AM	3.95	106.28	0.87	0.82
11:41 AM	3.70	105.36	0.87	0.82
Average	3.93	102.19	0.87	0.66

Signature 

Miss Katesarin Vorradetwittaya
Environmental Scientist

STAR PETROLEUM REFINING PUBLIC CO., LTD. EMISSION TEST RESULT

Run # : 3

Date: May 18, 2023 Location: Boiler 1

Start time: 11:42 AM Finish time: 12:02 PM

O₂ instrument Model: AMI 70 Serial No.: 111117-2

NO_x instrument Model: TELEDYNE 200 EM Serial No.: 433

SO₂ instrument Model: API 100 AH Serial No.: 060

CO instrument Model: THERMO 48 C Serial No.: 388

Fuel Type : Natural Gas Test Operator : Song H.

Time, min	O ₂ (%)	NO _x (ppm)	SO ₂ (ppm)	CO (ppm)
11:42 AM	3.92	104.84	0.87	0.75
11:43 AM	4.39	104.53	0.87	0.75
11:44 AM	3.95	105.02	0.87	0.54
11:45 AM	3.68	106.55	0.87	0.71
11:46 AM	4.18	106.67	0.87	0.83
11:47 AM	3.95	105.58	0.87	0.35
11:48 AM	3.29	105.43	0.87	0.83
11:49 AM	3.63	106.64	0.87	1.13
11:50 AM	3.96	108.07	0.87	1.13
11:51 AM	3.76	109.31	0.87	1.13
11:52 AM	3.86	109.07	0.87	1.13
11:53 AM	4.13	108.45	0.87	1.13
11:54 AM	3.90	107.36	0.87	0.42
11:55 AM	3.88	107.10	0.87	0.12
11:56 AM	3.71	108.48	0.87	0.28
11:57 AM	3.60	109.03	0.87	0.59
11:58 AM	3.62	108.83	0.87	1.02
11:59 AM	4.20	108.83	0.87	1.02
12:00 PM	3.96	109.41	0.87	1.02
12:01 PM	3.53	108.84	0.87	1.02
12:02 PM	3.86	108.60	0.87	1.02
Average	3.86	107.46	0.87	0.81

Signature



Miss Katesarin Vorradetwittaya
Environmental Scientist



บริษัท ซีคอต จำกัด

SECOT CO., LTD.

239 ถนนริมคลองประปา แขวงบางซื่อ เขตบางซื่อ กรุงเทพฯ 10800

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STACK EMISSION ANALYSIS REPORT

CLIENT NAME : Star Petroleum Refining Public Co., Ltd. REFERENCE NO. : Refinery-223003-COA-Stk/PM

SAMPLING BY : SECOT Co., Ltd. SAMPLING DATE : 18/05/2023

RECEIVED DATE : 22/05/2023 ANALYTICAL DATE : 24-25/05/2023

REPORT DATE : 29/05/2023 SAMPLE CONDITION : Normal

STACK LOCATION : Boiler#3 Stack OPERATOR : Mr. Kittipong Thakoengsuk

SOURCE DESCRIPTION : Combustion FUEL TYPE : Natural Gas + Refinery Fuel Gas

STACK DESCRIPTION

Height : 32.4 m Gas Velocity : 10.5 m/s

Diameter : 1.5 m Flow rate⁽¹⁾ : 683.8 Ncu.m/min

Temperature : 160.3 °C Excess Oxygen : 6.7 %

PARAMETER	UNIT	RESULTS ⁽¹⁾		ASSIGNED VALUE ⁽²⁾	STANDARD ⁽³⁾	REFERENCE METHODS
		6.7 % O ₂	7 % O ₂			
Particulate Matter	mg/Ncu.m	3.0	2.9	60	60	US EPA Method 5

Phatchara Samanchan

(Miss Phatchara Samanchan)

Analyst

REG.NO. 7-239-8-8183

Narisa Poowasanpetch

(Miss Narisa Poowasanpetch)

Technical Management Team

REG.NO. 7-239-8-6419

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).

The Monitoring Result of Emission Concentration
Boiler 3
STAR PETROLEUM REFINING PUBLIC CO., LTD.
May 18, 2023

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	6.63	6.66	48.46	48.43	47.27
2	6.63	6.65	49.12	49.09	47.88
3	6.64	6.66	51.01	50.98	49.76
Average	6.63	6.66	49.53	49.50	48.31

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	6.63	6.66	2.69	2.65	2.59
2	6.63	6.65	2.92	2.88	2.81
3	6.64	6.66	3.12	3.07	3.00
Average	6.63	6.66	2.91	2.87	2.80

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	6.63	6.66	0.26	0.25	0.24
2	6.63	6.65	0.20	0.18	0.18
3	6.64	6.66	0.17	0.15	0.15
Average	6.63	6.66	0.21	0.19	0.19

STAR PETROLEUM REFINING PUBLIC CO., LTD.
EMISSION TEST RESULT

Date: May 18, 2023
 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 : Boiler 3
 Finish time : 11:00 AM
 Serial No.: 121121-10
 Serial No.: 441
 Serial No.: 132
 Serial No.: 049
 Test Operator : Kittipong T.

Time, min	O ₂ (%)	NO _x (ppm)	SO ₂ (ppm)	CO (ppm)
10:40 AM	6.61	48.42	2.71	0.30
10:41 AM	6.65	48.83	2.71	0.30
10:42 AM	6.47	48.84	2.59	0.33
10:43 AM	6.52	48.66	2.42	0.30
10:44 AM	6.49	48.55	2.47	0.25
10:45 AM	6.58	48.72	2.72	0.25
10:46 AM	6.64	48.97	2.72	0.28
10:47 AM	6.66	48.83	2.72	0.29
10:48 AM	6.72	48.63	2.72	0.30
10:49 AM	6.78	48.65	2.73	0.26
10:50 AM	6.66	48.74	2.73	0.25
10:51 AM	6.61	48.51	2.73	0.30
10:52 AM	6.70	48.23	2.73	0.29
10:53 AM	6.53	48.45	2.72	0.20
10:54 AM	6.54	48.20	2.72	0.20
10:55 AM	6.44	47.84	2.72	0.30
10:56 AM	6.57	47.85	2.72	0.24
10:57 AM	6.77	47.92	2.71	0.24
10:58 AM	6.78	48.04	2.74	0.27
10:59 AM	6.79	48.28	2.71	0.20
11:00 AM	6.66	48.57	2.71	0.21
Average	6.63	48.46	2.69	0.26

Signature



Miss Katesarin Vorradetwittaya

Environmental Scientist

STAR PETROLEUM REFINING PUBLIC CO., LTD. EMISSION TEST RESULT

Run # : 2

Date: May 18, 2023 Location : Boiler 3

Start time: 11:01 AM Finish time: 11:21 AM

O₂ instrument Model: AMI 70 Serial No.: 121121-10

NO_x instrument Model: API 200 AH Serial No.: 441


SO₂ instrument Model: API 100 AH Serial No.: 132

CO instrument Model: THERMO 48 C Serial No.: 049

Fuel Type : Natural Gas Test Operator : Kittipong T.

Time, min	O ₂ (%)	NO _x (ppm)	SO ₂ (ppm)	CO (ppm)
11:01 AM	6.66	48.88	2.71	0.22
11:02 AM	6.58	48.67	2.71	0.21
11:03 AM	6.69	48.41	2.71	0.21
11:04 AM	6.62	48.85	2.71	0.21
11:05 AM	6.65	48.86	2.73	0.22
11:06 AM	6.63	48.63	2.94	0.21
11:07 AM	6.66	48.39	2.79	0.21
11:08 AM	6.63	48.10	2.84	0.21
11:09 AM	6.65	48.20	2.86	0.21
11:10 AM	6.70	48.18	2.98	0.21
11:11 AM	6.62	48.81	2.98	0.21
11:12 AM	6.67	49.09	2.98	0.17
11:13 AM	6.61	49.41	2.97	0.21
11:14 AM	6.62	49.63	2.97	0.21
11:15 AM	6.69	49.84	2.97	0.21
11:16 AM	6.71	49.99	2.97	0.21
11:17 AM	6.58	50.16	2.99	0.18
11:18 AM	6.43	50.13	3.26	0.19
11:19 AM	6.50	49.86	3.26	0.21
11:20 AM	6.66	49.91	2.98	0.21
11:21 AM	6.63	49.59	2.95	0.13
Average	6.63	49.12	2.92	0.20

Signature



Miss Katesarin Vorradetwittaya

Environmental Scientist

STAR PETROLEUM REFINING PUBLIC CO., LTD. EMISSION TEST RESULT

Run # : 3

Date: May 18, 2023 Location : Boiler 3

Start time: 11:22 AM Finish time: 11:42 AM

O₂ instrument Model: AMI 70 Serial No.: 121121-10

NO_x instrument Model: API 200 AH Serial No.: 441

SO₂ instrument Model: API 100 AH Serial No.: 132

CO instrument Model: THERMO 48 C Serial No.: 049

Fuel Type : Natural Gas Test Operator : Kittipong T.

Time, min	O ₂ (%)	NO _x (ppm)	SO ₂ (ppm)	CO (ppm)
11:22 AM	6.50	49.49	3.02	0.19
11:23 AM	6.48	49.58	2.97	0.21
11:24 AM	6.62	49.15	2.97	0.21
11:25 AM	6.57	49.44	3.17	0.19
11:26 AM	6.46	49.83	3.17	0.14
11:27 AM	6.45	49.93	2.97	0.21
11:28 AM	6.61	49.89	3.25	0.18
11:29 AM	6.66	50.82	3.24	0.13
11:30 AM	6.65	51.32	3.24	0.21
11:31 AM	6.53	51.86	3.24	0.11
11:32 AM	6.48	52.16	3.24	0.13
11:33 AM	6.75	52.04	3.24	0.21
11:34 AM	6.65	52.51	3.24	0.21
11:35 AM	6.56	52.92	3.24	0.21
11:36 AM	6.59	52.56	3.24	0.13
11:37 AM	6.55	51.83	3.25	0.11
11:38 AM	6.69	51.13	3.07	0.16
11:39 AM	6.69	50.83	2.95	0.19
11:40 AM	6.84	51.03	2.91	0.21
11:41 AM	7.08	51.30	2.96	0.18
11:42 AM	6.96	51.54	2.96	0.14
Average	6.64	51.01	3.12	0.17

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-223003-COA-Stk/PM
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING DATE	: 20/06/2023
RECEIVED DATE	: 21/06/2023	ANALYTICAL DATE	: 21-22/06/2023
REPORT DATE	: 22/06/2023	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	: 4.2	m/s
Diameter	: 2.2	m	Flow rate ⁽¹⁾	: 322	Ncu.m/min
Temperature	: 498.8	°C	Excess Oxygen	: 4.6	%

PARAMETER	UNIT	RESULTS ⁽¹⁾		ASSIGNED VALUE ⁽²⁾	STANDARD ⁽³⁾	REFERENCE METHODS
		4.6 % O ₂	7 % O ₂			
Particulate Matter	mg/Ncu.m	3.1	2.7	60	-	US EPA Method 5

Phatchara Samanchan

(Miss Phatchara Samanchan)

Analyst

REG.NO. 2-239-ก-8183

Maim Poowasanpetch

(Miss Narisa Poowasanpetch)

Technical Management Team

REG.NO. 2-239-ก-6419

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).



บริษัท ซีคอต จำกัด

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STACK EMISSION ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REFERENCE NO.	: Refinery-223003-COA-Stk/H2S
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING DATE	: 20/06/2023
RECEIVED DATE	: 21/06/2023	ANALYTICAL DATE	: 21/06/2023
REPORT DATE	: 27/06/2023	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	: 4.2	m/s
Diameter	: 2.2	m	Flow rate ⁽¹⁾	: 322	Ncu.m/min
Temperature	: 498.8	°C	Excess Oxygen	: 4.6	%

PARAMETER	UNIT	RESULTS ⁽¹⁾		ASSIGNED VALUE ⁽²⁾	STANDARD	REFERENCE METHODS
		4.6 % O ₂	7 % O ₂			
Hydrogen Sulfide	ppm	<0.3	<0.3	60	-	US EPA Method 16

Sudaporn Soonthorn

(Miss Sudaporn Soonthorn)

Analyst

Maim 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 Expasion 3 of Refinery Plant, B.E. 2561 (2018).

**The Monitoring Result of Emission Concentration
SRU
STAR PETROLEUM REFINING PUBLIC CO.,LTD.
June 20, 2023**

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	4.52	4.46	10.93	10.88	9.20
2	4.69	4.63	11.16	11.12	9.50
3	4.63	4.58	10.64	10.61	9.04
Average	4.61	4.56	10.91	10.87	9.24

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	4.52	4.46	315.50	315.49	266.75
2	4.69	4.63	312.47	312.45	266.94
3	4.63	4.58	312.97	312.95	266.54
Average	4.61	4.56	313.65	313.63	266.74

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	4.52	4.46	318.31	318.42	269.22
2	4.69	4.63	319.46	319.57	273.02
3	4.63	4.58	319.25	319.35	272.00
Average	4.61	4.56	319.01	319.11	271.41

**STAR PETROLEUM REFINING PUBLIC CO.,LTD.
EMISSION TEST RESULT**

Date: June 20, 2023
Start time: 3:10 PM
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 : SRU
Finish time : 3:30 PM
Serial No.: 111117-2
Serial No.: 314
Serial No.: 060
Serial No.: 388
Test Operator : Song H.

Time, min	O ₂ (%)	NO _x (ppm)	SO ₂ (ppm)	CO (ppm)
3:10 PM	4.53	10.60	318.26	317.12
3:11 PM	4.64	10.74	317.33	315.73
3:12 PM	4.47	11.11	316.88	316.41
3:13 PM	4.58	10.71	318.21	314.57
3:14 PM	4.74	10.91	318.06	312.54
3:15 PM	4.54	11.19	315.71	311.02
3:16 PM	4.63	11.30	314.18	310.67
3:17 PM	4.45	11.35	312.65	312.53
3:18 PM	4.40	10.82	313.62	313.88
3:19 PM	4.37	10.80	314.30	317.23
3:20 PM	4.50	10.93	313.32	314.92
3:21 PM	4.67	11.04	312.63	317.97
3:22 PM	4.48	10.95	313.07	319.99
3:23 PM	4.59	10.86	313.46	320.49
3:24 PM	4.21	10.77	314.63	321.33
3:25 PM	4.50	10.80	315.76	322.52
3:26 PM	4.56	10.96	315.66	323.36
3:27 PM	4.25	10.95	316.72	324.03
3:28 PM	4.48	10.87	318.02	325.73
3:29 PM	4.68	10.90	317.08	326.41
3:30 PM	4.56	10.94	315.96	326.07
Average	4.52	10.93	315.50	318.31

Signature



Miss Katesarin Vorradetwittaya

Environmental Scientist

STAR PETROLEUM REFINING PUBLIC CO.,LTD. EMISSION TEST RESULT

Date: June 20, 2023
Start time: 3:31 PM
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 : SRU
Finish time : 3:51 PM
Serial No.: 111117-2
Serial No.: 314
Serial No.: 060
Serial No.: 388
Test Operator : Song H.

Time, min	O ₂ (%)	NO _x (ppm)	SO ₂ (ppm)	CO (ppm)
3:31 PM	4.73	11.18	314.83	325.73
3:32 PM	4.65	11.15	313.88	324.37
3:33 PM	4.61	11.24	312.90	322.34
3:34 PM	4.71	11.30	312.31	319.64
3:35 PM	4.54	11.35	312.15	317.78
3:36 PM	4.59	11.28	313.29	317.96
3:37 PM	4.70	11.20	313.64	318.29
3:38 PM	4.62	11.26	313.35	318.29
3:39 PM	4.59	11.26	314.18	319.47
3:40 PM	4.81	11.31	312.70	319.63
3:41 PM	4.69	11.40	311.61	318.46
3:42 PM	4.82	11.45	311.75	317.27
3:43 PM	4.78	11.08	311.75	316.59
3:44 PM	4.76	11.19	310.13	315.57
3:45 PM	4.71	11.19	310.13	319.88
3:46 PM	4.65	10.97	309.89	319.88
3:47 PM	4.58	10.99	310.91	320.39
3:48 PM	4.74	11.09	311.92	319.72
3:49 PM	4.78	10.84	313.06	319.71
3:50 PM	4.58	10.77	313.65	319.37
3:51 PM	4.79	10.92	313.93	318.36
Average	4.69	11.16	312.47	319.46

Signature



Miss Katesarin Vorradetwittaya
Environmental Scientist

STAR PETROLEUM REFINING PUBLIC CO.,LTD. EMISSION TEST RESULT

Date: June 20, 2023
Start time: 3:52 PM
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 # : 3
Location : SRU
Finish time : 4:12 PM
Serial No.: 111117-2
Serial No.: 314
Serial No.: 060
Serial No.: 388
Test Operator : Song H.

Time, min	O ₂ (%)	NO _x (ppm)	SO ₂ (ppm)	CO (ppm)
3:52 PM	4.70	10.75	314.26	317.19
3:53 PM	4.77	10.76	314.20	317.50
3:54 PM	4.70	10.74	314.82	317.65
3:55 PM	4.76	10.59	315.06	318.32
3:56 PM	4.74	10.53	315.11	320.20
3:57 PM	4.67	10.54	314.71	320.70
3:58 PM	4.50	10.59	313.38	320.69
3:59 PM	4.75	10.72	313.42	320.86
4:00 PM	4.75	10.75	313.69	319.83
4:01 PM	4.63	10.75	312.80	318.48
4:02 PM	4.68	10.77	312.19	317.61
4:03 PM	4.66	10.70	311.88	317.44
4:04 PM	4.72	10.65	310.95	317.60
4:05 PM	4.61	10.65	311.96	317.77
4:06 PM	4.54	10.59	312.10	318.95
4:07 PM	4.49	10.52	311.90	319.96
4:08 PM	4.61	10.50	312.60	320.64
4:09 PM	4.64	10.51	312.10	321.14
4:10 PM	4.44	10.55	311.42	320.81
4:11 PM	4.31	10.62	311.81	320.64
4:12 PM	4.54	10.60	311.96	320.31
Average	4.63	10.64	312.97	319.25

Signature



Miss Katesarin Vorradetwittaya
Environmental Scientist



บริษัท ซีคอต จำกัด
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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-223003-COA-Stk/PM
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING DATE	: 22/05/2023
RECEIVED DATE	: 24/05/2023	ANALYTICAL DATE	: 24-25/05/2023
REPORT DATE	: 29/05/2023	SAMPLE CONDITION	: Normal
STACK LOCATION	: HRSG#1 Stack	OPERATOR	: Mr. Song Hengchwankun
SOURCE DESCRIPTION	: Combustion	FUEL TYPE	: Natural Gas + Refinery Fuel Gas
STACK DESCRIPTION			

Height	: 21.7	m	Gas Velocity	: 16.7	m/s
Diameter	: 3.0	m	Flow rate ⁽¹⁾	: 3,850	Ncu.m/min
Temperature	: 206.8	°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	2.7	5.7	60	60	US EPA Method 5

Phatchara Samanchan

(Miss Phatchara Samanchan)

Analyst

REG.NO. ๓-239-๓-8183

Narisa Poowasanpetch

(Miss Narisa Poowasanpetch)

Technical Management Team

REG.NO. ๓-239-๓-6419

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 HRSG 1 STAR PETROLEUM REFINING PUBLIC CO., LTD. May 22, 2023

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	14.20	14.33	46.40	46.41	98.19
2	14.20	14.26	46.42	46.44	97.22
3	14.22	14.20	45.59	45.62	94.64
Average	14.21	14.26	46.13	46.16	96.67

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	14.20	14.33	0.33	0.29	0.61
2	14.20	14.26	0.35	0.30	0.63
3	14.22	14.20	0.35	0.29	0.60
Average	14.21	14.26	0.34	0.29	0.61

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	14.20	14.33	1.81	1.78	3.77
2	14.20	14.26	1.61	1.57	3.29
3	14.22	14.20	1.73	1.69	3.51
Average	14.21	14.26	1.72	1.68	3.52

STAR PETROLEUM REFINING PUBLIC CO., LTD. EMISSION TEST RESULT

Run # : 1
Date: May 22, 2023 **Location :** HRSG 1
Start time: 11:30 AM **Finish time :** 11:50 AM
O₂ instrument Model: AMI 70 **Serial No.:** 111117-2
NO_x instrument Model: TELEDYNE 200 EM **Serial No.:** 433
SO₂ instrument Model: API 100 AH **Serial No.:** 060
CO instrument Model: THERMO 48 C **Serial No.:** 388
Fuel Type : Natural Gas **Test Operator :** Song H.

Time, min	O ₂ (%)	NO _x (ppm)	SO ₂ (ppm)	CO (ppm)
11:30 AM	14.25	44.69	0.38	1.82
11:31 AM	14.27	44.69	0.38	1.82
11:32 AM	14.28	44.80	0.38	1.82
11:33 AM	14.29	44.90	0.38	1.82
11:34 AM	14.27	44.92	0.38	1.48
11:35 AM	14.13	46.92	0.35	1.83
11:36 AM	14.14	46.78	0.35	1.83
11:37 AM	14.15	46.70	0.35	1.83
11:38 AM	14.17	46.48	0.33	1.83
11:39 AM	14.17	46.42	0.34	1.83
11:40 AM	14.17	46.46	0.34	1.83
11:41 AM	14.21	46.59	0.32	1.83
11:42 AM	14.21	46.79	0.31	1.83
11:43 AM	14.21	46.98	0.31	1.83
11:44 AM	14.19	47.15	0.29	1.83
11:45 AM	14.19	47.32	0.29	1.83
11:46 AM	14.18	47.35	0.31	1.83
11:47 AM	14.18	47.26	0.31	1.83
11:48 AM	14.20	47.07	0.30	1.83
11:49 AM	14.19	47.05	0.32	1.83
11:50 AM	14.20	47.04	0.31	1.83
Average	14.20	46.40	0.33	1.81

Signature



Miss Katesarin Vorradetwittaya
Environmental Scientist

STAR PETROLEUM REFINING PUBLIC CO., LTD. EMISSION TEST RESULT

Run # : 2
Date: May 22, 2023 **Location :** HRSG 1
Start time: 11:51 AM **Finish time :** 12:11 PM
O₂ instrument Model: AMI 70 **Serial No.:** 111117-2
NO_x instrument Model: TELEDYNE 200 EM **Serial No.:** 433
SO₂ instrument Model: API 100 AH **Serial No.:** 060
CO instrument Model: THERMO 48 C **Serial No.:** 388
Fuel Type : Natural Gas **Test Operator :** Song H.

Time, min	O ₂ (%)	NO _x (ppm)	SO ₂ (ppm)	CO (ppm)
11:51 AM	14.21	46.90	0.32	1.83
11:52 AM	14.22	46.82	0.32	1.83
11:53 AM	14.19	46.68	0.33	1.83
11:54 AM	14.21	46.50	0.35	1.83
11:55 AM	14.21	46.55	0.34	1.83
11:56 AM	14.17	46.65	0.35	1.83
11:57 AM	14.17	46.66	0.34	1.62
11:58 AM	14.19	46.65	0.35	1.40
11:59 AM	14.21	46.63	0.35	1.74
12:00 PM	14.17	46.57	0.35	1.32
12:01 PM	14.17	46.62	0.36	1.32
12:02 PM	14.21	46.65	0.38	1.32
12:03 PM	14.20	46.49	0.35	1.61
12:04 PM	14.21	46.38	0.35	1.82
12:05 PM	14.18	46.33	0.34	1.82
12:06 PM	14.21	46.16	0.35	1.82
12:07 PM	14.21	45.89	0.35	1.82
12:08 PM	14.20	45.87	0.35	1.44
12:09 PM	14.19	45.91	0.33	1.32
12:10 PM	14.21	45.86	0.34	1.23
12:11 PM	14.18	45.96	0.35	1.32
Average	14.20	46.42	0.35	1.61

Signature



Miss Katesarin Vorradetwittaya
Environmental Scientist

STAR PETROLEUM REFINING PUBLIC CO., LTD.

EMISSION TEST RESULT

Run # : 3

Date: May 22, 2023 Location : HRSG 1

Start time: 12:12 PM Finish time: 12:32 PM

O₂ instrument Model: AMI 70 Serial No.: 111117-2

NO_x instrument Model: TELEDYNE 200 EM Serial No.: 433

SO₂ instrument Model: API 100 AH Serial No.: 060

CO instrument Model: THERMO 48 C Serial No.: 388

Fuel Type : Natural Gas Test Operator : Song H.

Time, min	O ₂ (%)	NO _x (ppm)	SO ₂ (ppm)	CO (ppm)
12:12 PM	14.19	45.97	0.35	1.32
12:13 PM	14.22	45.96	0.34	1.61
12:14 PM	14.22	45.99	0.34	1.83
12:15 PM	14.20	45.80	0.35	1.57
12:16 PM	14.22	45.66	0.34	1.82
12:17 PM	14.22	45.70	0.26	1.73
12:18 PM	14.22	45.59	0.33	1.81
12:19 PM	14.22	45.51	0.35	1.81
12:20 PM	14.23	45.53	0.35	1.81
12:21 PM	14.22	45.55	0.35	1.81
12:22 PM	14.22	45.48	0.35	1.81
12:23 PM	14.23	45.40	0.35	1.51
12:24 PM	14.20	45.45	0.35	1.43
12:25 PM	14.20	45.51	0.35	1.80
12:26 PM	14.22	45.36	0.35	1.81
12:27 PM	14.22	45.31	0.36	1.81
12:28 PM	14.21	45.58	0.35	1.81
12:29 PM	14.23	45.65	0.35	1.81
12:30 PM	14.22	45.58	0.36	1.81
12:31 PM	14.22	45.44	0.38	1.81
12:32 PM	14.23	45.29	0.35	1.81
Average	14.22	45.59	0.35	1.73

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-223003-COA-Stk/Bz

SAMPLING BY : SECOT Co., Ltd. SAMPLING DATE : 18/05/2023

RECEIVED DATE : 20/05/2023 ANALYTICAL DATE : 23-24/05/2023

REPORT DATE : 29/05/2023 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⁾ : 9.7 Nm³/min

Temperature⁽¹⁾ : 42.0 °C Excess Oxygen⁽¹⁾ : 20.8 %

PARAMETER	UNIT	RESULTS		ASSIGN VALUE ⁽²⁾	STANDARD	REFERENCE METHODS
		INLET	OUTLET			
Benzene	ppm	81.3	0.78	-	-	US EPA Method 18
	mg/l	0.26	0.002	0.21	-	
	g/s	-	0.0004	0.017	-	

Sudaporn Soonthorn

(Miss Sudaporn Soonthorn)

Analyst

Narisra Poowasanpetch

(Miss Narisa Poowasanpetch)

Technical Management Team

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

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3. ⁽¹⁾ The data from VRU Outlet.

4. ⁽²⁾ Assigned value in EIA Report Expasion 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-223003-COA-Stk/TVOC
SAMPLING BY : SECOT Co., Ltd. SAMPLING DATE : 18/05/2023
RECEIVED DATE : 20/05/2023 ANALYTICAL DATE : 22/05/2023
REPORT DATE : 29/05/2023 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⁾ : 9.68 Nm³/min
Temperature⁽¹⁾ : 42.0 °C Excess Oxygen⁽¹⁾ : 20.8 %

PARAMETER	UNIT	RESULTS		ASSIGN VALUE ⁽²⁾	STANDARD ⁽³⁾	REFERENCE METHODS
		INLET	OUTLET			
TVOCs	ppm	26,492	371	-	-	US EPA Method 25A
	mg/l	47.7	0.67	15	17	
	g/s	-	0.108	1.212	-	

Sudaporn Soonthorn

(Miss Sudaporn Soonthorn)

Analyst

Narisa Poowasanpetch

(Miss Narisa Poowasanpetch)

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.2553 (2010).

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WATER AND WASTEWATER ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No.	: 0021/65
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Grab
SAMPLING DATE	: 05/01/2023	SAMPLING TIME	: 13.40
RECEIVED DATE	: 06/01/2023	ANALYTICAL DATE	: 06-13/01/2023
REPORT DATE	: 13/01/2023	SITE OPERATOR	: Mr. Watcharakan Pramakhate
SAMPLE CONDITION	: Normal	FILE CODE	: 223003_WW_January

PARAMETER	UNIT	ANALYSIS METHODS	ND	STATION	STANDARD ^{1/}
			(non-detectable)	Near the refinery outfall	
Temperature	°C	2550 B	< 0.5	28.8	≤ 40
pH		4500-H ⁺ B	< 0.10	8.43	5.5-9.0
Total Dissolved Solids	mg/l	2540 C	< 50	1,120	≤ 3,000
Total Suspended Solids	mg/l	2540 D	< 5	< 5	≤ 50
Ammonia Nitrogen	mg/l	4500-NH ₃ B,C	< 0.02	0.03	
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	1.2	≤ 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 21st ED. 2017 (AWWA APHA WEF)

Khemchuda Insorn

(Miss Khemchuda Insorn)

Analyst

REG. NO. 2-239-ก-5976

Mrs. Araya Tipparuk

(Mrs. Araya Tipparuk)

Technical Management Team

REG. NO. 2-239-ก-5863

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WATER AND WASTEWATER ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No.	: 0156/66
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Grab
SAMPLING DATE	: 03/02/2023	SAMPLING TIME	: 09.53
RECEIVED DATE	: 04/02/2023	ANALYTICAL DATE	: 04-12/02/2023
REPORT DATE	: 13/02/2023	SITE OPERATOR	: Mr. Watcharakan Pramakhate
SAMPLE CONDITION	: Normal	FILE CODE	: 223003_WW_February

PARAMETER	UNIT	ANALYSIS METHODS	ND	STATION	STANDARD ^{1/}
			(non-detectable)	Near the refinery outfall	
Temperature	°C	2550 B	< 0.5	29.8	≤ 40
pH		4500-H ⁺ B	< 0.10	8.13	5.5-9.0
Total Dissolved Solids	mg/l	2540 C	< 50	1,756	≤ 3,000
Total Suspended Solids	mg/l	2540 D	< 5	8	≤ 50
Ammonia Nitrogen	mg/l	4500-NH ₃ B,C	< 0.02	0.87	
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	2.7	≤ 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	0.003	≤ 0.75
Mercury (Hg)	mg/l	3112 B	< 0.0005	ND	≤ 0.005

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

Khemchuda Insorn

(Miss Khemchuda Insorn)

Analyst

REG. NO. 2-239-ก-5976

Mrs. Araya Tipparuk

(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.	: 0392/66
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Grab
SAMPLING DATE	: 10/03/2023	SAMPLING TIME	: 10.18
RECEIVED DATE	: 11/03/2023	ANALYTICAL DATE	: 11-19/03/2023
REPORT DATE	: 20/03/2023	SITE OPERATOR	: Mr. Watcharakan Pramakhate
SAMPLE CONDITION	: Normal	FILE CODE	: 223003_WW_March

PARAMETER	UNIT	ANALYSIS METHODS	ND (non-detectable)	STATION Near the refinery outfall	STANDARD ^{1/}
Temperature	°C	2550 B	< 0.5	31.6	≤ 40
pH		4500-H ⁺ B	< 0.10	8.37	5.5-9.0
Total Dissolved Solids	mg/l	2540 C	< 50	1,738	≤ 3,000
Total Suspended Solids	mg/l	2540 D	< 5	16	≤ 50
Ammonia Nitrogen	mg/l	Method 350.2	< 0.02	0.08	
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	1.4	≤ 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	0.002	≤ 0.75
Mercury (Hg)	mg/l	3112 B	< 0.0005	ND	≤ 0.005

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

Khemchuda Insorn

(Miss Khemchuda Insorn)

Analyst

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Mrs. Araya Tipparuk

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WATER AND WASTEWATER ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No.	: 0592/66
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Grab
SAMPLING DATE	: 17/04/2023	SAMPLING TIME	: 10.06
RECEIVED DATE	: 18/04/2023	ANALYTICAL DATE	: 18-27/04/2023
REPORT DATE	: 27/04/2023	SITE OPERATOR	: Mr. Watcharakan Pramakhate
SAMPLE CONDITION	: Normal	FILE CODE	: 223003_WW_April

PARAMETER	UNIT	ANALYSIS METHODS	ND (non-detectable)	STATION Near the refinery outfall	STANDARD ^{1/}
Temperature	°C	2550 B	< 0.5	36.8	≤ 40
pH		4500-H ⁺ B	< 0.10	7.91	5.5-9.0
Total Dissolved Solids	mg/l	2540 C	< 50	1,374	≤ 3,000
Total Suspended Solids	mg/l	2540 D	< 5	9	≤ 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	0.005	≤ 0.75
Mercury (Hg)	mg/l	3112 B	< 0.0005	ND	≤ 0.005

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

Khemchuda Insorn

(Miss Khemchuda Insorn)

Analyst

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WATER AND WASTEWATER ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No.	: 0702/66
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Grab
SAMPLING DATE	: 05/05/2023	SAMPLING TIME	: 09:10
RECEIVED DATE	: 06/05/2023	ANALYTICAL DATE	: 06-11/05/2023
REPORT DATE	: 12/05/2023	SITE OPERATOR	: Mr. Watcharakon Pramakhate
SAMPLE CONDITION	: Normal	FILE CODE	: 223003_WW_May

PARAMETER	UNIT	ANALYSIS METHODS	ND	STATION	STANDARD ^{1/}
			(non-detectable)	Near the refinery outfall	
Temperature	°C	2550 B	< 0.5	32.0	≤ 40
pH	-	4500-H ⁺ B	< 0.10	8.37	5.5-9.0
Total Dissolved Solids	mg/l	2540 C	< 50	1,196	≤ 3,000
Total Suspended Solids	mg/l	2540 D	< 5	20	≤ 50
Ammonia Nitrogen	mg/l	Method 350.2	< 0.02	0.05	-
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	1.8	≤ 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	0.002	≤ 0.75
Mercury (Hg)	mg/l	3112 B	< 0.0005	ND	≤ 0.005

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

Khemchuda Insorn

(Miss Khemchuda Insorn)

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REG. NO. 7-239-ก-5976

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Technical Management Team

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WATER AND WASTEWATER ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No.	: 0904/66
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Grab
SAMPLING DATE	: 07/06/2023	SAMPLING TIME	: 11:02
RECEIVED DATE	: 08/06/2023	ANALYTICAL DATE	: 08-15/06/2023
REPORT DATE	: 15/06/2023	SITE OPERATOR	: Mr. Watcharakon Pramakhate
SAMPLE CONDITION	: Normal	FILE CODE	: 223003_WW_June

PARAMETER	UNIT	ANALYSIS METHODS	ND	STATION	STANDARD ^{1/}
			(non-detectable)	Near the refinery outfall	
Temperature	°C	2550 B	< 0.5	31.3	≤ 40
pH	-	4500-H ⁺ B	< 0.10	7.45	5.5-9.0
Total Dissolved Solids	mg/l	2540 C	< 50	623	≤ 3,000
Total Suspended Solids	mg/l	2540 D	< 5	33	≤ 50
Ammonia Nitrogen	mg/l	Method 350.2	< 0.02	0.72	-
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	1.2	≤ 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 21st ED. 2017 (AWWA, APHA, WEF)

Khemchuda Insorn

(Miss Khemchuda Insorn)

Analyst

REG. NO. 7-239-ก-5976

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WATER AND WASTEWATER ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No.	: 0020/66
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Grab
SAMPLING DATE	: 05/01/2023	SAMPLING TIME	: 16.04-16.31
RECEIVED DATE	: 06/01/2023	ANALYTICAL DATE	: 06-13/01/2023
REPORT DATE	: 13/01/2023	SITE OPERATOR	: Mr. Watcharakon Pramakhate
SAMPLE CONDITION	: Normal	FILE CODE	: 223003_SW_January
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	31.1	30.7	n ¹⁾
pH	-	4500-H ⁺ B	< 0.10	8.38	8.36	5 - 9
Total Dissolved Solids	mg/l	2540 C	< 50	4,472	3,372	-
Suspended Solids	mg/l	2540 D	< 5	35	20	-
Ammonia Nitrogen	mg/l	4500-NH ₃ B,C	< 0.02	0.23	0.33	≤ 0.5
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	≤ 0.005
BOD ₅	mg/l	5210 B	< 1.0	3.4	3.0	≤ 4.0
COD	mg/l	5220 D	< 40.00	49.05	52.32	-
Chromium Hexavalent (Cr ⁶⁺)	mg/l	3500-Cr B	< 0.01	ND	ND	≤ 0.05
Chromium Trivalent (Cr ³⁺)	mg/l	3113 B/Calculation	< 0.001	ND	ND	-
Mercury (Hg)	mg/l	3112 B	< 0.0005	ND	ND	≤ 0.002

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

Khemchuda Insorn
(Miss Khemchuda Insorn)

Analyst

Araya Tipparuk
(Mrs. Araya Tipparuk)

Technical Management Team

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3. ¹⁾ Notification of the National Environment Board No.8 B.E.2537 (1994) for Surface Water Class 4.

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.	: 0155/66
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Grab
SAMPLING DATE	: 03/02/2023	SAMPLING TIME	: 10.30-11.20
RECEIVED DATE	: 04/02/2023	ANALYTICAL DATE	: 04-12/02/2023
REPORT DATE	: 13/02/2023	SITE OPERATOR	: Mr. Watcharakon Pramakhate
SAMPLE CONDITION	: Normal	FILE CODE	: 223003_SW_February
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	32.8	32.1	-
pH	-	4500-H ⁺ B	< 0.10	8.39	8.43	-
Total Dissolved Solids	mg/l	2540 C	< 50	5,740	5,008	-
Suspended Solids	mg/l	2540 D	< 5	33	26	-
Ammonia Nitrogen	mg/l	4500-NH ₃ B,C	< 0.02	0.62	0.71	-
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	2.9	2.5	-
COD	mg/l	5220 D	< 40.00	44.57	< 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	0.005	0.006	-
Mercury (Hg)	mg/l	3112 B	< 0.0005	ND	ND	-

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

Khemchuda Insorn
(Miss Khemchuda Insorn)

Analyst

Araya Tipparuk
(Mrs. Araya Tipparuk)

Technical Management Team

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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.	: 0393/66
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Grab
SAMPLING DATE	: 10/03/2023	SAMPLING TIME	: 10.45-11.20
RECEIVED DATE	: 11/03/2023	ANALYTICAL DATE	: 11-19/03/2023
REPORT DATE	: 20/03/2023	SITE OPERATOR	: Mr. Watcharakan Pramakhate
SAMPLE CONDITION	: Normal	FILE CODE	: 223003_SW_March
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	35.0	33.4	-
pH		4500-H ⁺ B	< 0.10	8.54	8.54	-
Total Dissolved Solids	mg/l	2540 C	< 50	5,612	4,820	-
Suspended Solids	mg/l	2540 D	< 5	18	30	-
Ammonia Nitrogen	mg/l	4500-NH ₃ B,C	< 0.02	0.94	0.99	-
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	3.4	3.1	-
COD	mg/l	5220 D	< 40.00	54.43	44.83	-
Chromium Hexavalent (Cr ⁶⁺)	mg/l	3500-Cr B	< 0.01	ND	ND	-
Chromium Trivalent (Cr ³⁺)	mg/l	3113 B/Calculation	< 0.001	0.010	0.008	-
Mercury (Hg)	mg/l	3112 B	< 0.0005	ND	ND	-

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

Khemchuda Insorn

(Miss Khemchuda Insorn)

Analyst

Mrs. Araya Tipparuk

(Mrs. Araya Tipparuk)

Technical Management Team

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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.	: 0593/66
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Grab
SAMPLING DATE	: 17/04/2023	SAMPLING TIME	: 15.35-15.48
RECEIVED DATE	: 18/04/2023	ANALYTICAL DATE	: 18-27/04/2023
REPORT DATE	: 27/04/2023	SITE OPERATOR	: Mr. Watcharakan Pramakhate
SAMPLE CONDITION	: Normal	FILE CODE	: 223003_SW_April
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	36.2	36.2	-
pH		4500-H ⁺ B	< 0.10	8.97	8.91	-
Total Dissolved Solids	mg/l	2540 C	< 50	5,372	4,412	-
Suspended Solids	mg/l	2540 D	< 5	7	8	-
Ammonia Nitrogen	mg/l	4500-NH ₃ B,C	< 0.02	0.81	0.67	-
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	2.2	2.1	-
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	0.010	0.011	-
Mercury (Hg)	mg/l	3112 B	< 0.0005	ND	ND	-

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

Khemchuda Insorn

(Miss Khemchuda Insorn)

Analyst

Mrs. 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.	: 0704/66
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Grab
SAMPLING DATE	: 05/05/2023	SAMPLING TIME	: 10:00-10:40
RECEIVED DATE	: 06/05/2023	ANALYTICAL DATE	: 06-11/05/2023
REPORT DATE	: 12/05/2023	SITE OPERATOR	: Mr. Watcharakan Pramakhate
SAMPLE CONDITION	: Normal	FILE CODE	: 223003_SW_May
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	34.8	35.0	-
pH	-	4500-H ⁺ B	< 0.10	8.71	8.58	-
Total Dissolved Solids	mg/l	2540 C	< 50	4,236	4,328	-
Suspended Solids	mg/l	2540 D	< 5	28	26	-
Ammonia Nitrogen	mg/l	4500-NH ₃ B,C	< 0.02	2.0	1.8	-
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	3.6	3.2	-
COD	mg/l	5220 D	< 40.00	45.83	42.55	-
Chromium Hexavalent (Cr ⁶⁺)	mg/l	3500-Cr B	< 0.01	ND	ND	-
Chromium Trivalent (Cr ³⁺)	mg/l	3113 B/Calculation	< 0.001	0.005	0.007	-
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

NT

(Mrs. Araya Tipparuk)

Technical Management Team

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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.	: 0906/66
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Grab
SAMPLING DATE	: 07/06/2023	SAMPLING TIME	: 13:50-14:30
RECEIVED DATE	: 08/06/2023	ANALYTICAL DATE	: 08-15/06/2023
REPORT DATE	: 15/06/2023	SITE OPERATOR	: Mr. Watcharakan Pramakhate
SAMPLE CONDITION	: Normal	FILE CODE	: 223003_SW_June
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	35.3	35.2	-
pH	-	4500-H ⁺ B	< 0.10	8.74	8.62	-
Total Dissolved Solids	mg/l	2540 C	< 50	5,780	4,728	-
Suspended Solids	mg/l	2540 D	< 5	19	27	-
Ammonia Nitrogen	mg/l	4500-NH ₃ B,C	< 0.02	0.75	0.83	-
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	1.5	-
COD	mg/l	5220 D	< 40.00	59.46	56.16	-
Chromium Hexavalent (Cr ⁶⁺)	mg/l	3500-Cr B	< 0.01	ND	ND	-
Chromium Trivalent (Cr ³⁺)	mg/l	3113 B/Calculation	< 0.001	0.002	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

NT

(Mrs. Araya Tipparuk)

Technical Management Team

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 3. ^{1/} Notification of the National Environment Board No.8 B.E.2537 (1994) for Surface Water Class 5.
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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.	: 0021/66
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Grab
SAMPLING DATE	: 05/01/2023	SAMPLING TIME	: 13.54-14.51
RECEIVED DATE	: 06/01/2023	ANALYTICAL DATE	: 06-13/01/2023
REPORT DATE	: 13/01/2023	SITE OPERATOR	: Mr. Watcharakan Pramakhate
SAMPLE CONDITION	: Normal	FILE CODE	: 223003_WW_January
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	32.2	33.5	34.4	32.8
pH	-	4500-H ⁺ B	< 0.10	8.41	8.15	9.52	7.42
Total Dissolved Solids	mg/l	2540 C	< 50	1,126	1,340	1,228	1,178
Suspended Solids	mg/l	2540 D	< 5	13	62	51	< 5
Fat Oil & Grease	mg/l	5520 B	< 0.50	0.50	2.1	5.4	ND
Phenols	mg/l	5530 B,C* / B,D	< 0.001*, < 0.10	0.58	0.55	2.2	ND*
Sulfide as H ₂ S	mg/l	4500-S ²⁻ F	< 0.20	ND	ND	2.1	ND
BOD ₅	mg/l	5210 B	< 1.0	47.4	33.0	112	< 1.0
COD	mg/l	5220 D	< 40.00	146	157	336	< 40.00
Ammonia Nitrogen	mg/l	4500-NH ₃ B,C/Method 350.2*	< 0.02	8.0	4.3	6.3	0.06*
Chromium Trivalent (Cr ³⁺)	mg/l	3113 B/Calculation	< 0.001	ND	0.008	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	0.0008	0.0014	0.0068	ND

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

REFERENCE : US EPA, 1983, Method for Chemical Analysis of Water and Waste, USEPA, EPA 600/4-79-010, Method 350.2

Khemchuda Insorn

(Miss Khemchuda Insorn)

Analyst

REG. NO. 7-239-ก-5976

M. Araya Tipparuk

(Mrs. Araya Tipparuk)

Technical Management Team

REG. NO. 7-239-ก-5863

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WATER AND WASTEWATER ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No.	: 0156/66
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Grab
SAMPLING DATE	: 03/02/2023	SAMPLING TIME	: 09.20-09.42
RECEIVED DATE	: 04/02/2023	ANALYTICAL DATE	: 04-12/02/2023
REPORT DATE	: 13/02/2023	SITE OPERATOR	: Mr. Watcharakan Pramakhate
SAMPLE CONDITION	: Normal	FILE CODE	: 223003_WW_February
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	30.2	34.6	31.8	31.8
pH	-	4500-H ⁺ B	< 0.10	8.75	8.12	9.21	7.74
Total Dissolved Solids	mg/l	2540 C	< 50	1,090	2,140	2,068	1,970
Suspended Solids	mg/l	2540 D	< 5	16	19	14	8
Fat Oil & Grease	mg/l	5520 B	< 0.50	ND	ND	2.1	ND
Phenols	mg/l	5530 B,C* / B,D	< 0.001*, < 0.10	0.31	0.62	3.4	ND*
Sulfide as H ₂ S	mg/l	4500-S ²⁻ F	< 0.20	ND	ND	6.6	ND
BOD ₅	mg/l	5210 B	< 1.0	49.1	39.0	154	3.2
COD	mg/l	5220 D	< 40.00	106	125	221	< 40.00
Ammonia Nitrogen	mg/l	4500-NH ₃ B,C/Method 350.2*	< 0.02	16.0	6.6	9.8	1.3
Chromium Trivalent (Cr ³⁺)	mg/l	3113 B/Calculation	< 0.001	0.003	0.006	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	0.0011	0.0008	0.0100	0.0011

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

REFERENCE : US EPA, 1983, Method for Chemical Analysis of Water and Waste, USEPA, EPA 600/4-79-010, Method 350.2

Khemchuda Insorn

(Miss Khemchuda Insorn)

Analyst

REG. NO. 7-239-ก-5976

M. Araya Tipparuk

(Mrs. Araya Tipparuk)

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REG. NO. 7-239-ก-5863

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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.	: 0392/66
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Grab
SAMPLING DATE	: 10/03/2023	SAMPLING TIME	: 09.00-10.10
RECEIVED DATE	: 11/03/2023	ANALYTICAL DATE	: 11-19/03/2023
REPORT DATE	: 20/03/2023	SITE OPERATOR	: Mr. Watcharakan Pramakhate
SAMPLE CONDITION	: Normal	FILE CODE	: 223003_WW_March
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	37.5	37.2	35.6	34.0
pH	-	4500-H ⁺ B	< 0.10	7.48	7.99	9.31	7.67
Total Dissolved Solids	mg/l	2540 C	< 50	1,296	1,674	1,956	1,816
Suspended Solids	mg/l	2540 D	< 5	49	6	27	< 5
Fat Oil & Grease	mg/l	5520 B	< 0.50	15.5	3.1	3.6	ND
Phenols	mg/l	5530 B,C* / B,D	< 0.001*, < 0.10	1.8	1.4	4.6	ND*
Sulfide as H ₂ S	mg/l	4500-S ²⁻ F	< 0.20	5.4	1.9	25.1	ND
BOD ₅	mg/l	5210 B	< 1.0	79.6	35.0	112	1.4
COD	mg/l	5220 D	< 40.00	278	122	336	44.83
Ammonia Nitrogen	mg/l	4500-NH ₃ B,C/Method 350.2*	< 0.02	10.0	10.0	14.7	0.07
Chromium Trivalent (Cr ³⁺)	mg/l	3113 B/Calculation	< 0.001	0.020	0.005	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	0.0061	ND	0.0068	ND

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

REFERENCE : US EPA, 1981, Method for Chemical Analysis of Water and Waste, USEPA, EPA 600/4-79/020, Method 350.2

Khemchuda Insorn

(Miss Khemchuda Insorn)

Analyst

REG. NO. 2-239-ก-5976

Araya Tipparuk

(Mrs. Araya Tipparuk)

Technical Management Team

REG. NO. 2-239-ก-5863

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WATER AND WASTEWATER ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No.	: 0592/66
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Grab
SAMPLING DATE	: 17/04/2023	SAMPLING TIME	: 10.18-10.52
RECEIVED DATE	: 18/04/2023	ANALYTICAL DATE	: 19-27/04/2023
REPORT DATE	: 27/04/2023	SITE OPERATOR	: Mr. Watcharakan Pramakhate
SAMPLE CONDITION	: Normal	FILE CODE	: 223003_WW_April
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	39.5	39.4	36.3	38.8
pH	-	4500-H ⁺ B	< 0.10	7.23	7.66	9.27	7.37
Total Dissolved Solids	mg/l	2540 C	< 50	538	594	1,062	1,352
Suspended Solids	mg/l	2540 D	< 5	134	< 5	36	< 5
Fat Oil & Grease	mg/l	5520 B	< 0.50	19.5	3.5	5.4	ND
Phenols	mg/l	5530 B,C* / B,D	< 0.001*, < 0.10	1.3	0.87	4.3	ND*
Sulfide as H ₂ S	mg/l	4500-S ²⁻ F	< 0.20	ND	1.0	6.8	ND
BOD ₅	mg/l	5210 B	< 1.0	75.4	26.0	87.6	< 1.0
COD	mg/l	5220 D	< 40.00	267	225	276	< 40.00
Ammonia Nitrogen	mg/l	4500-NH ₃ B,C/Method 350.2*	< 0.02	3.6	3.6	1.4	0.04*
Chromium Trivalent (Cr ³⁺)	mg/l	3113 B/Calculation	< 0.001	0.028	0.007	0.004	0.006
Chromium Hexavalent (Cr ⁶⁺)	mg/l	3500-Cr B	< 0.01	ND	ND	ND	ND
Mercury (Hg)	mg/l	3112 B	< 0.0005	0.0080	0.0064	0.0039	ND

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

REFERENCE : US EPA, 1981, Method for Chemical Analysis of Water and Waste, USEPA, EPA 600/4-79/020, Method 350.2

Khemchuda Insorn

(Miss Khemchuda Insorn)

Analyst

REG. NO. 2-239-ก-5976

Araya Tipparuk

(Mrs. Araya Tipparuk)

Technical Management Team

REG. NO. 2-239-ก-5863

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WATER AND WASTEWATER ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No.	: 0702/66
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Grab
SAMPLING DATE	: 05/05/2023	SAMPLING TIME	: 09:18-09:35
RECEIVED DATE	: 06/05/2023	ANALYTICAL DATE	: 06-11/05/2023
REPORT DATE	: 12/05/2023	SITE OPERATOR	: Mr. Watcharakon Pramakhate
SAMPLE CONDITION	: Normal	FILE CODE	: 223003_WW_May
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	31.0	37.0	36.0	35.0
pH		4500-H ⁺ B	< 0.10	8.95	8.44	9.84	8.37
Total Dissolved Solids	mg/l	2540 C	< 50	1,090	942	1,284	1,224
Suspended Solids	mg/l	2540 D	< 5	29	13	17	< 5
Fat Oil & Grease	mg/l	5520 B	< 0.50	ND	1.3	5.3	ND
Phenols	mg/l	5530 B,C* / B,D	< 0.001*, < 0.10	0.37	0.17	6.2	ND*
Sulfide as H ₂ S	mg/l	4500-S ²⁻ F	< 0.20	0.99	0.60	7.2	ND
BOD ₅	mg/l	5210 B	< 1.0	79.9	51.4	173	1.4
COD	mg/l	5220 D	< 40.00	166	144	372	< 40.00
Ammonia Nitrogen	mg/l	4500-NH ₃ B,C/Method 350.2*	< 0.02	25.1	5.2	7.6	ND
Chromium Trivalent (Cr ³⁺)	mg/l	3113 B/Calculation	< 0.001	0.005	0.006	0.006	ND
Chromium Hexavalent (Cr ⁶⁺)	mg/l	3500-Cr B	< 0.01	ND	ND	ND	ND
Mercury (Hg)	mg/l	3112 B	< 0.0005	0.0036	ND	0.0033	ND

REFERENCE : STANDARD METHODS FOR EXAMINATION OF WATER AND WASTEWATER 21st ED. 2012 (AWWA APHA, WEF)

REFERENCE : US EPA, 1983, Method for Chemical Analysis of Water and Waste, USEPA, EPA 600/4-79/020, Method 150.2

Khemchuda Insorn

(Miss Khemchuda Insorn)

Analyst

REG. NO. 7-239-ก-5976

M. Araya Tipparuk

(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.	: 0904/66
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Grab
SAMPLING DATE	: 07/06/2023	SAMPLING TIME	: 09:31-10:40
RECEIVED DATE	: 08/06/2023	ANALYTICAL DATE	: 08-15/06/2023
REPORT DATE	: 15/06/2023	SITE OPERATOR	: Mr. Watcharakon Pramakhate
SAMPLE CONDITION	: Normal	FILE CODE	: 223003_WW_June
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	34.8	36.1	34.2
pH		4500-H ⁺ B	< 0.10	8.26	7.66	9.26	7.52
Total Dissolved Solids	mg/l	2540 C	< 50	1,175	779	893	955
Suspended Solids	mg/l	2540 D	< 5	< 5	6	14	< 5
Fat Oil & Grease	mg/l	5520 B	< 0.50	3.2	0.64	5.9	ND
Phenols	mg/l	5530 B,C* / B,D	< 0.001*, < 0.10	0.44	0.72	3.5	ND*
Sulfide as H ₂ S	mg/l	4500-S ²⁻ F	< 0.20	2.4	0.72	1.9	ND
BOD ₅	mg/l	5210 B	< 1.0	73.4	17.8	63.0	< 1.0
COD	mg/l	5220 D	< 40.00	198	95.80	232	< 40.00
Ammonia Nitrogen	mg/l	4500-NH ₃ B,C/Method 350.2*	< 0.02	25.0	3.9	4.5	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	0.0040	ND	0.0014	ND

REFERENCE : STANDARD METHODS FOR EXAMINATION OF WATER AND WASTEWATER 21st ED. 2012 (AWWA APHA, WEF)

REFERENCE : US EPA, 1983, Method for Chemical Analysis of Water and Waste, USEPA, EPA 600/4-79/020, Method 150.2

Khemchuda Insorn

(Miss Khemchuda Insorn)

Analyst

REG. NO. 7-239-ก-5976

M. Araya Tipparuk

(Mrs. Araya Tipparuk)

Technical Management Team

REG. NO. 7-239-ก-5863

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WATER AND WASTEWATER ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No.	: 0847/66
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Integrate
SAMPLING DATE	: 29/05/2023	SAMPLING TIME	: 10:28
RECEIVED DATE	: 30/05/2023	ANALYTICAL DATE	: 30/05/2023-10/06/2023
REPORT DATE	: 17/06/2023	SITE OPERATOR	: Mr. Baworn Deechaiya
SAMPLE CONDITION	: Normal	FILE CODE	: 223003_CW_May

PARAMETER	UNITS	ANALYSIS METHODS	ND (non-detectable)	SATATION Ko Saket	STANDARD ^{1/}
Depth	m.	Measurement	-	2.6	-
Temperature	°C	2550 B	< 0.5	31.5	$\Delta \leq 2$
pH	-	4500-H ⁺ B	< 0.10	8.02	7.0-8.5
Transparency	m.	Secchi Disc	-	1.0	$\Delta \leq 10\%$
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	6.10	^{2/}
Ammonia Nitrogen	µg/l	4500-NH ₃ F	< 10.0	12.9	-
Phenols	mg/l	5530 B-C	< 0.001	ND	≤ 0.03
Dissolved Oxygen	mg/l	4500-O G	< 0.10	4.80	≥ 4
BOD ₅	mg/l	5210 B	< 1.0	2.2	-
Salinity	ppt	2520 B	< 0.10	30.8	$\Delta \leq 10\%$
Total Petroleum Hydrocarbon	µg/l	IOC/GGE(MSI)-III/3	< 0.10	ND	≤ 5
TOC	mg/l	5310 B	< 0.01	1.81	-
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

(Signature)

(Miss Khemchuda Insorn)

Analyst

(Signature)

(Mrs. Araya Tippasuk)

Technical Management Team

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^{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.

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WATER AND WASTEWATER ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No.	: 0847/66
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Integrate
SAMPLING DATE	: 29/05/2023	SAMPLING TIME	: 10:43
RECEIVED DATE	: 30/05/2023	ANALYTICAL DATE	: 30/05/2023-10/06/2023
REPORT DATE	: 17/06/2023	SITE OPERATOR	: Mr. Baworn Deechaiya
SAMPLE CONDITION	: Normal	FILE CODE	: 223003_CW_May

PARAMETER	UNITS	ANALYSIS METHODS	ND (non-detectable)	SATATION Had Sai Thong Beach	STANDARD ^{1/}
Depth	m.	Measurement	-	3.7	-
Temperature	°C	2550 B	< 0.5	32.1	$\Delta \leq 1$
Transparency	m.	Secchi Disc	-	0.8	$\Delta \leq 10\%$
pH	-	4500-H ⁺ B	< 0.10	7.99	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	11.98	^{2/}
Ammonia Nitrogen	µg/l	4500-NH ₃ F	< 10.0	18.8	-
Phenols	mg/l	5530 B-C	< 0.001	ND	≤ 0.03
Dissolved Oxygen	mg/l	4500-O G	< 0.10	4.6	≥ 4
BOD ₅	mg/l	5210 B	< 1.0	1.8	-
Salinity	ppt	2520 B	< 0.10	31.4	$\Delta \leq 10\%$
Total Petroleum Hydrocarbon	µg/l	IOC/GGE(MSI)-III/3	< 0.10	ND	≤ 0.5
TOC	mg/l	5310 B	< 0.01	1.78	-
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

(Signature)

(Miss Khemchuda Insorn)

Analyst

(Signature)

(Mrs. Araya Tippasuk)

Technical Management Team

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^{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. - Not available.



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WATER AND WASTEWATER ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No.	: 0847/66
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Integrate
SAMPLING DATE	: 29/05/2023	SAMPLING TIME	: 10:27
RECEIVED DATE	: 30/05/2023	ANALYTICAL DATE	: 30/05/2023-10/06/2023
REPORT DATE	: 17/06/2023	SITE OPERATOR	: Mr. Baworn Deechaiya
SAMPLE CONDITION	: Normal	FILE CODE	: 223003_CW_May

PARAMETER	UNITS	ANALYSIS METHODS	ND (non-detectable)	SATATION Wastewater Discharge Point of Refinery (IEAT)	STANDARD ^{1/}
Depth	m.	Measurement	-	2.0	-
Temperature	°C	2550 B	< 0.5	31.5	$\Delta \leq 2$
Transparency	m.	Secchi Disc	-	0.7	$\Delta \leq 10 \%$
pH	-	4500-H ⁺ B	< 0.10	7.57	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	15.27	^{2/}
Ammonia Nitrogen	µg/l	4500-NH ₃ F	< 10.0	96.4	-
Phenols	mg/l	5530 B-C	< 0.001	ND	≤ 0.03
Dissolved Oxygen	mg/l	4500-O G	< 0.10	4.3	≥ 4
BOD ₅	mg/l	5210 B	< 1.0	2.5	-
Salinity	ppt	2520 B	< 0.10	20.9	$\Delta \leq 10 \%$
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 19th 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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^{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. - Not available



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WATER AND WASTEWATER ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No.	: 0847/66
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Integrate
SAMPLING DATE	: 29/05/2023	SAMPLING TIME	: 10:36
RECEIVED DATE	: 30/05/2023	ANALYTICAL DATE	: 30/05/2023-10/06/2023
REPORT DATE	: 17/06/2023	SITE OPERATOR	: Mr. Baworn Deechaiya
SAMPLE CONDITION	: Normal	FILE CODE	: 223003_CW_May

PARAMETER	UNITS	ANALYSIS METHODS	ND (non-detectable)	SATATION Open Coastal Water	STANDARD ^{1/}
Depth	m.	Measurement	-	4.4	-
Temperature	°C	2550 B	< 0.5	31.2	$\Delta \leq 2$
Transparency	m.	Secchi Disc	< 0.10	1.2	$\Delta \leq 10 \%$
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	5.40	^{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	6.2	≥ 4
BOD ₅	mg/l	5210 B	< 1.0	2.3	-
Salinity	ppt	2520 B	< 0.10	31.5	$\Delta \leq 10 \%$
Total Petroleum Hydrocarbon	µg/l	IOC/GGE(MSI)-III/3	< 0.10	ND	≤ 5
TOC	mg/l	5310 B	< 0.01	1.79	-
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 19th ED. 2017 (AWWA APHA WEF)

REFERENCE : Intergovernmental Oceanographic Commission of UNESCO (IOC) 1981

(Miss Khemchuda Insorn)

Analyst

(Mrs. Araya Tipparuk)

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/} 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. - Not available

ใบรับรองผลการตรวจวัดระดับเสียง



Noise Monitoring Result : Community Noise

MTR-SPRC PLC-Refinery

Location : Main Office Complex	Monitor Period : 16-23 May 2023
SLM Model : RION NL-21	Serial No : 00187505
Site Operator : Mr. Siwanon Kulawong	

Calibrator Model : RION NC-74	Serial No : 34283648
Calibration Ref dB(A) : 94.0	Certified Date : 13 Jan 2023
SLM Reading / Adjust dB(A) : 93.7/0.3	Expire Date : 12 Jan 2024
Cal Sheet No.: NC-74-2023-026	

Time	Equivalent Sound Pressure Level (dB(A))						
	16-17 May 2023	17-18 May 2023	18-19 May 2023	19-20 May 2023	20-21 May 2023	21-22 May 2023	22-23 May 2023
15:00 - 16:00	56.2	52.7	56.6	56.2	55.0	55.6	55.5
16:00 - 17:00	55.1	54.6	56.8	56.4	56.3	56.1	67.4
17:00 - 18:00	55.0	52.7	56.0	55.8	55.8	54.8	66.0
18:00 - 19:00	54.2	51.5	55.9	55.8	54.5	55.0	55.9
19:00 - 20:00	53.2	49.1	54.2	54.8	54.9	53.9	54.8
20:00 - 21:00	55.2	49.8	50.7	52.0	52.9	49.9	53.5
21:00 - 22:00	61.0	50.1	50.0	49.7	48.8	49.5	50.2
22:00 - 23:00	56.3	50.4	50.5	50.2	49.9	50.3	49.5
23:00 - 00:00	54.9	51.4	53.7	49.9	50.6	49.9	49.4
00:00 - 01:00	55.0	50.2	51.5	48.5	51.5	49.4	51.0
01:00 - 02:00	54.6	51.0	51.1	49.0	50.4	49.7	50.4
02:00 - 03:00	51.9	50.8	52.1	50.5	49.9	50.4	48.2
03:00 - 04:00	51.4	51.3	52.3	51.5	49.2	50.7	46.8
04:00 - 05:00	52.7	51.8	49.7	50.8	50.2	51.4	48.1
05:00 - 06:00	54.2	53.2	52.3	52.0	50.2	52.4	49.0
06:00 - 07:00	56.6	58.0	54.5	53.2	50.5	53.2	53.0
07:00 - 08:00	54.6	59.1	59.1	56.3	51.9	56.2	54.9
08:00 - 09:00	55.6	59.0	58.9	55.6	55.3	55.5	56.5
09:00 - 10:00	56.3	59.4	60.4	55.8	55.5	58.4	56.7
10:00 - 11:00	55.3	58.8	59.9	56.9	56.6	56.0	57.1
11:00 - 12:00	57.1	58.1	58.5	57.0	55.8	56.0	56.3
12:00 - 13:00	58.4	58.7	58.5	55.5	56.6	55.0	56.3
13:00 - 14:00	54.8	58.3	59.0	57.1	56.6	56.2	57.1
14:00 - 15:00	54.4	56.6	58.2	56.3	54.4	55.9	56.6

Leq(24)*	55.7	55.5	56.3	54.5	53.9	54.2	58.0
Ldn	61.2	60.0	59.9	58.4	57.8	58.4	59.9
Lmax **	81.5	75.1	88.4	81.0	88.4	81.7	87.7

Standard-24Hr	70 dB(A)
Standard-Max	115 dB(A)

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

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

(Miss Katesarin Vorradetwittaya)
Environmental Scientist

Preeda S.
(Miss Preeda Somjai)
Technical Management Team



Noise Monitoring Result : Background Noise

MTR-SPRC PLC-Refinery

Location : Main Office Complex	Monitor Period : 16-23 May 2023
SLM Model : RION NL-21	Serial No : 00187505
Site Operator : Mr. Siwanon Kulawong	

Calibrator Model : RION NC-74	Serial No : 34283648
Calibration Ref dB(A) : 94.0	Certified Date : 13 Jan 2023
SLM Reading / Adjust dB(A) : 93.7/0.3	Expire Date : 12 Jan 2024
Cal Sheet No.: NC-74-2023-026	

Time	L90 (dB(A))						
	16-17 May 2023	17-18 May 2023	18-19 May 2023	19-20 May 2023	20-21 May 2023	21-22 May 2023	22-23 May 2023
15:00 - 16:00	53.1	51.1	54.9	55.0	53.5	53.9	53.1
16:00 - 17:00	52.8	50.5	54.7	54.3	53.7	50.5	56.0
17:00 - 18:00	53.3	49.7	54.1	54.1	53.9	51.8	56.0
18:00 - 19:00	53.3	48.8	54.0	53.4	53.3	52.6	53.1
19:00 - 20:00	49.3	47.5	53.0	53.4	53.2	52.5	53.2
20:00 - 21:00	50.1	48.0	49.0	49.3	48.6	47.7	50.2
21:00 - 22:00	52.3	48.2	48.7	48.3	47.1	47.6	48.4
22:00 - 23:00	53.8	48.8	49.2	48.2	48.3	48.7	47.9
23:00 - 00:00	52.6	49.6	51.5	47.8	49.3	48.5	48.0
00:00 - 01:00	51.2	49.0	50.3	45.6	49.8	47.6	48.7
01:00 - 02:00	50.6	49.6	49.8	45.7	48.5	48.3	47.2
02:00 - 03:00	50.0	49.5	50.8	49.2	48.1	49.1	45.7
03:00 - 04:00	49.8	50.0	50.5	50.1	47.8	49.5	45.8
04:00 - 05:00	50.8	50.7	47.4	49.5	48.9	50.1	44.8
05:00 - 06:00	51.5	51.0	48.8	49.4	48.5	50.3	46.8
06:00 - 07:00	53.4	52.2	50.6	50.7	47.1	50.5	50.2
07:00 - 08:00	53.2	56.7	56.4	52.8	46.7	53.4	50.4
08:00 - 09:00	54.2	57.0	57.1	54.4	52.6	53.5	54.1
09:00 - 10:00	54.5	57.4	57.6	54.7	54.3	55.2	54.5
10:00 - 11:00	53.6	56.5	57.9	55.8	54.4	54.6	55.4
11:00 - 12:00	56.0	56.3	56.4	54.7	53.8	53.5	53.9
12:00 - 13:00	56.1	57.1	56.7	53.9	54.9	52.2	54.2
13:00 - 14:00	53.3	56.0	57.4	56.2	55.5	55.1	55.5
14:00 - 15:00	53.2	54.7	55.8	54.3	53.3	53.6	53.8

L90(avg)*	53.0	53.3	54.2	52.7	52.0	52.1	52.4
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Remark : * Average time between 15:00-15:00

(Miss Katesarin Vorradetwittaya)
Environmental Scientist

Preeda S.
(Miss Preeda Somjai)
Technical Management Team



Noise Monitoring Result : Community Noise

MTR-SPRC PLC-Refinery

Location : Central Control Building

SLM Model : RION NL-21

Site Operator : Mr. Siwanon Kulawong

Monitor Period : 16-23 May 2023

Serial No : 00198277

Calibrator Model : RION NC-74

Serial No : 34283648

Calibration Ref dB(A) : 94.0

Certified Date : 13 Jan 2023

SLM Reading / Adjust dB(A) : 93.8/0.2

Expire Date : 12 Jan 2024

Cal Sheet No.: NC-74-2023-026

Time	Equivalent Sound Pressure Level (dB(A))						
	16-17 May 2023	17-18 May 2023	18-19 May 2023	19-20 May 2023	20-21 May 2023	21-22 May 2023	22-23 May 2023
15:00 - 16:00	64.8	64.1	64.7	65.8	63.7	64.0	64.8
16:00 - 17:00	64.0	64.1	64.0	64.1	63.5	64.0	64.6
17:00 - 18:00	64.2	64.2	66.5	63.7	63.6	63.7	64.5
18:00 - 19:00	64.6	64.5	64.3	64.1	64.0	63.8	63.8
19:00 - 20:00	64.4	64.4	64.4	64.3	64.1	64.0	63.7
20:00 - 21:00	64.4	64.4	64.2	64.3	64.4	63.9	63.9
21:00 - 22:00	64.6	64.4	64.3	64.4	64.1	64.0	64.0
22:00 - 23:00	64.9	64.3	64.3	64.5	64.2	64.0	64.0
23:00 - 00:00	65.1	64.5	64.6	64.6	64.3	64.0	64.0
00:00 - 01:00	64.9	64.2	64.5	64.8	64.3	64.2	64.5
01:00 - 02:00	64.5	64.4	64.0	64.5	64.1	64.7	64.2
02:00 - 03:00	64.5	64.4	64.1	64.2	64.1	64.3	64.3
03:00 - 04:00	64.7	64.3	64.3	64.3	64.2	64.3	64.2
04:00 - 05:00	64.6	64.5	64.3	64.1	64.3	64.3	64.1
05:00 - 06:00	64.5	64.4	64.3	64.3	64.2	64.3	64.2
06:00 - 07:00	64.5	64.7	64.3	64.2	64.2	64.3	64.3
07:00 - 08:00	67.8	65.9	65.7	64.1	64.2	64.4	64.5
08:00 - 09:00	64.6	65.0	65.2	66.1	65.2	64.7	64.5
09:00 - 10:00	64.4	65.2	65.0	64.1	64.1	64.7	64.6
10:00 - 11:00	64.4	65.6	64.6	63.9	64.0	64.8	65.0
11:00 - 12:00	64.2	64.8	64.6	64.2	64.2	64.8	64.6
12:00 - 13:00	64.4	64.5	64.7	64.2	64.2	64.6	64.5
13:00 - 14:00	68.4	65.5	65.0	64.1	64.2	64.6	64.3
14:00 - 15:00	64.1	64.5	65.1	63.8	64.0	64.6	64.2
Leq(24)*	65.0	64.6	64.7	64.4	64.2	64.3	64.3
Ldn	71.2	70.9	70.8	70.8	70.6	70.7	70.6
Lmax **	93.4	83.1	84.0	88.4	77.6	68.1	70.7
Standard-24Hr	70 dB(A)						
Standard-Max	115 dB(A)						

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 : Central Control Building

SLM Model : RION NL-21

Site Operator : Mr. Siwanon Kulawong

Monitor Period : 16-23 May 2023

Serial No : 00198277

Calibrator Model : RION NC-74

Serial No : 34283648

Calibration Ref dB(A) : 94.0

Certified Date : 13 Jan 2023

SLM Reading / Adjust dB(A) : 93.8/0.2

Expire Date : 12 Jan 2024

Cal Sheet No.: NC-74-2023-026

Time	L90 (dB(A))						
	16-17 May 2023	17-18 May 2023	18-19 May 2023	19-20 May 2023	20-21 May 2023	21-22 May 2023	22-23 May 2023
15:00 - 16:00	63.8	63.7	63.9	64.9	63.3	63.6	64.4
16:00 - 17:00	63.7	63.7	63.6	63.4	63.2	63.6	64.3
17:00 - 18:00	63.9	63.8	63.9	63.2	63.3	63.3	64.1
18:00 - 19:00	64.2	64.1	63.9	63.8	63.6	63.4	63.4
19:00 - 20:00	64.0	64.0	63.9	63.9	63.7	63.5	63.4
20:00 - 21:00	64.1	64.1	63.8	63.9	63.9	63.6	63.5
21:00 - 22:00	64.2	64.1	63.9	64.0	63.8	63.6	63.7
22:00 - 23:00	64.5	63.9	64.0	64.2	63.9	63.6	63.7
23:00 - 00:00	64.5	64.0	64.0	64.2	63.9	63.7	63.7
00:00 - 01:00	64.5	63.9	64.0	64.4	63.9	63.9	64.0
01:00 - 02:00	64.2	64.0	63.7	64.1	63.7	64.3	63.8
02:00 - 03:00	64.1	64.0	63.7	63.8	63.7	64.0	63.9
03:00 - 04:00	64.3	63.9	63.9	63.9	63.8	64.0	63.8
04:00 - 05:00	64.3	64.1	63.9	63.7	63.8	64.0	63.8
05:00 - 06:00	64.1	64.0	64.0	64.0	63.9	64.0	63.9
06:00 - 07:00	64.1	64.0	63.8	63.8	63.9	64.0	64.0
07:00 - 08:00	64.0	64.5	64.1	63.7	63.8	64.1	64.1
08:00 - 09:00	64.0	64.1	64.2	63.6	63.8	64.2	64.2
09:00 - 10:00	64.0	64.1	64.2	63.8	63.8	64.3	64.2
10:00 - 11:00	64.0	64.3	63.8	63.5	63.6	64.4	64.6
11:00 - 12:00	63.7	63.8	63.7	63.6	63.7	64.4	64.3
12:00 - 13:00	63.9	63.8	63.9	63.5	63.7	64.3	64.2
13:00 - 14:00	64.0	63.9	64.1	63.6	63.8	64.3	64.0
14:00 - 15:00	63.6	63.8	64.4	63.4	63.6	64.3	63.9
L90(avg)*	64.1	64.0	63.9	63.8	63.7	63.9	64.0

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 : Northern Refinery Boundary Station 1 Monitor Period : 16-23 May 2023
SLM Model : RION NL-21 Serial No : 00187489
Site Operator : Mr. Siwanon Kulawong

Calibrator Model : RION NC-74 Serial No : 34283648
Calibration Ref dB(A) : 94.0 Certified Date : 13 Jan 2023
SLM Reading / Adjust dB(A) : 93.9/0.1 Expire Date : 12 Jan 2024
Cal Sheet No.: NC-74-2023-026

Time	Equivalent Sound Pressure Level (dB(A))						
	16-17 May 2023	17-18 May 2023	18-19 May 2023	19-20 May 2023	20-21 May 2023	21-22 May 2023	22-23 May 2023
16:00 - 17:00	61.3	61.2	56.6	57.4	55.8	54.2	57.2
17:00 - 18:00	60.5	61.4	61.9	63.1	57.3	55.6	57.8
18:00 - 19:00	57.5	59.8	59.9	60.7	59.6	57.1	62.7
19:00 - 20:00	55.6	56.0	60.2	60.0	57.2	57.6	59.5
20:00 - 21:00	52.6	54.7	55.9	60.5	55.8	55.7	59.6
21:00 - 22:00	53.4	53.0	54.8	55.8	53.8	53.8	56.8
22:00 - 23:00	54.4	52.9	53.0	52.9	53.6	53.4	55.6
23:00 - 00:00	54.6	53.2	53.2	55.0	52.9	52.3	52.7
00:00 - 01:00	53.0	53.2	54.7	52.3	53.4	52.4	52.5
01:00 - 02:00	53.5	52.4	52.7	51.2	53.8	52.0	52.0
02:00 - 03:00	52.8	61.5	53.3	51.3	52.1	51.9	52.5
03:00 - 04:00	52.8	52.3	54.0	52.0	51.6	52.3	51.2
04:00 - 05:00	54.3	53.4	53.2	52.9	51.6	52.4	50.7
05:00 - 06:00	58.2	55.1	51.4	52.5	52.2	52.8	51.2
06:00 - 07:00	62.3	58.4	55.3	53.3	52.0	53.0	50.8
07:00 - 08:00	59.5	63.8	62.8	58.4	53.8	55.3	53.7
08:00 - 09:00	57.5	61.2	61.2	60.4	57.8	61.1	59.2
09:00 - 10:00	57.1	58.0	57.7	58.5	53.8	62.2	62.5
10:00 - 11:00	58.9	58.2	60.4	56.1	55.5	57.8	58.1
11:00 - 12:00	56.4	58.6	60.1	68.9	54.2	55.6	59.0
12:00 - 13:00	58.2	57.9	59.4	69.9	55.0	56.2	58.4
13:00 - 14:00	56.7	58.1	57.5	56.6	54.5	59.4	58.4
14:00 - 15:00	56.6	56.9	59.7	57.3	53.9	58.0	59.1
15:00 - 16:00	54.5	57.2	63.7	56.1	54.4	58.5	63.6
Leq(24)*	57.3	58.3	58.6	60.9	54.9	56.5	58.1
Ldn	63.1	63.1	61.7	62.7	59.7	60.2	60.9
Lmax **	89.3	89.2	88.7	97.3	90.1	92.6	93.5
Standard-24Hr	70 dB(A)						
Standard-Max	115 dB(A)						

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 1 Monitor Period : 16-23 May 2023
SLM Model : RION NL-21 Serial No : 00187489
Site Operator : Mr. Siwanon Kulawong

Calibrator Model : RION NC-74 Serial No : 34283648
Calibration Ref dB(A) : 94.0 Certified Date : 13 Jan 2023
SLM Reading / Adjust dB(A) : 93.9/0.1 Expire Date : 12 Jan 2024
Cal Sheet No.: NC-74-2023-026

Time	L90 (dB(A))						
	16-17 May 2023	17-18 May 2023	18-19 May 2023	19-20 May 2023	20-21 May 2023	21-22 May 2023	22-23 May 2023
16:00 - 17:00	51.7	51.1	52.4	52.2	51.0	50.8	51.9
17:00 - 18:00	51.5	52.5	53.8	52.1	50.0	52.0	51.7
18:00 - 19:00	51.8	52.1	53.6	52.9	52.3	50.5	53.5
19:00 - 20:00	51.0	50.6	53.7	51.9	51.6	50.9	52.8
20:00 - 21:00	50.6	50.6	52.2	52.1	51.1	51.2	51.9
21:00 - 22:00	51.3	50.2	51.5	52.1	50.5	51.3	52.0
22:00 - 23:00	53.0	51.1	51.2	50.8	50.1	49.9	51.5
23:00 - 00:00	53.1	51.1	51.6	50.5	51.3	50.3	50.6
00:00 - 01:00	50.9	51.5	52.9	49.9	52.1	50.9	50.2
01:00 - 02:00	52.3	51.2	51.6	48.4	51.6	49.9	50.2
02:00 - 03:00	51.7	51.8	52.0	47.4	50.8	50.5	50.7
03:00 - 04:00	51.5	51.3	52.7	50.8	50.2	50.6	47.5
04:00 - 05:00	52.3	52.1	50.4	51.7	50.3	51.1	47.5
05:00 - 06:00	53.5	52.5	48.5	51.3	50.9	51.7	47.5
06:00 - 07:00	53.9	52.7	50.3	51.1	48.6	51.8	48.2
07:00 - 08:00	52.5	56.2	53.8	52.5	48.0	52.0	49.3
08:00 - 09:00	51.0	54.3	54.9	53.1	48.0	53.3	52.9
09:00 - 10:00	49.5	53.8	54.1	52.1	45.8	52.4	53.6
10:00 - 11:00	50.0	54.4	54.9	51.6	47.7	51.8	53.4
11:00 - 12:00	52.1	54.1	54.9	53.5	47.2	51.5	54.8
12:00 - 13:00	52.3	53.3	54.0	51.8	48.2	50.8	54.6
13:00 - 14:00	51.4	53.1	53.3	51.5	49.5	51.8	54.7
14:00 - 15:00	51.8	53.4	54.2	52.2	49.4	51.5	54.1
15:00 - 16:00	51.4	53.3	55.0	51.3	50.4	52.5	54.6
L90(avg)*	51.9	52.7	53.1	51.6	50.1	51.4	52.2

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 2				Monitor Period : 16-23 May 2023			
SLM Model : RION NL-21				Serial No : 00487723			
Site Operator : Mr. Siwanon Kulawong							
Calibrator Model : RION NC-74				Serial No : 34283648			
Calibration Ref dB(A) : 94.0				Certified Date : 13 Jan 2023			
SLM Reading / Adjust dB(A) : 93.7/0.3				Expire Date : 12 Jan 2024			
Cal Sheet No.: NC-74-2023-026							
Time	Equivalent Sound Pressure Level (dB(A))						
	16-17 May 2023	17-18 May 2023	18-19 May 2023	19-20 May 2023	20-21 May 2023	21-22 May 2023	22-23 May 2023
16:00 - 17:00	56.9	55.8	56.4	54.7	53.9	54.1	54.2
17:00 - 18:00	54.6	56.3	56.3	57.1	53.1	54.7	54.1
18:00 - 19:00	59.1	56.1	55.4	55.1	55.6	54.1	56.6
19:00 - 20:00	53.8	56.5	56.8	55.7	54.4	52.4	56.2
20:00 - 21:00	53.7	53.5	53.6	55.3	54.9	53.8	55.0
21:00 - 22:00	54.1	52.8	54.0	54.2	52.9	52.5	56.3
22:00 - 23:00	54.8	53.5	53.6	53.9	53.5	53.0	54.7
23:00 - 00:00	56.9	55.2	53.4	53.3	53.7	52.8	53.9
00:00 - 01:00	53.7	55.3	57.2	54.1	55.0	53.0	53.6
01:00 - 02:00	54.1	53.7	53.4	54.9	56.6	54.4	54.3
02:00 - 03:00	53.5	53.5	52.9	51.7	53.3	52.8	55.7
03:00 - 04:00	53.7	53.3	53.7	52.7	53.0	53.2	54.4
04:00 - 05:00	54.8	53.4	53.6	53.3	52.6	53.2	53.4
05:00 - 06:00	56.5	55.3	52.3	52.8	52.9	53.0	53.6
06:00 - 07:00	55.9	54.7	55.0	53.8	52.2	53.5	53.7
07:00 - 08:00	55.0	56.8	54.9	54.6	53.7	54.2	54.8
08:00 - 09:00	54.9	55.9	56.0	56.0	55.2	55.2	56.8
09:00 - 10:00	54.5	55.1	55.7	54.8	52.7	55.0	56.3
10:00 - 11:00	54.4	55.3	55.6	54.6	52.2	53.5	56.0
11:00 - 12:00	54.8	55.4	57.7	53.9	52.8	54.5	57.2
12:00 - 13:00	55.2	53.7	56.3	53.9	53.1	54.1	60.0
13:00 - 14:00	56.2	54.7	55.2	53.9	53.5	55.2	58.2
14:00 - 15:00	54.7	55.3	55.3	54.4	53.7	54.1	60.4
15:00 - 16:00	53.8	56.3	56.6	53.6	54.8	55.0	57.5
Leq (24)*	55.2	55.0	55.3	54.4	53.9	53.9	56.2
Ldn	61.5	60.9	60.8	60.1	60.3	59.8	61.1
Lmax **	76.2	75.7	78.8	79.0	76.1	79.9	85.3
Standard-24Hr	70 dB(A)						
Standard-Max	115 dB(A)						

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 2				Monitor Period : 16-23 May 2023			
SLM Model : RION NL-21				Serial No : 00487723			
Site Operator : Mr. Siwanon Kulawong							
Calibrator Model : RION NC-74				Serial No : 34283648			
Calibration Ref dB(A) : 94.0				Certified Date : 13 Jan 2023			
SLM Reading / Adjust dB(A) : 93.7/0.3				Expire Date : 12 Jan 2024			
Cal Sheet No.: NC-74-2023-026							
Time	L90 (dB(A))						
	16-17 May 2023	17-18 May 2023	18-19 May 2023	19-20 May 2023	20-21 May 2023	21-22 May 2023	22-23 May 2023
16:00 - 17:00	53.4	53.5	54.0	52.6	51.6	52.5	52.9
17:00 - 18:00	52.7	53.9	54.4	52.4	51.1	52.4	52.9
18:00 - 19:00	53.8	53.5	54.0	53.7	52.8	51.7	53.6
19:00 - 20:00	52.6	51.8	54.3	53.3	52.0	50.4	54.0
20:00 - 21:00	52.3	51.8	52.4	53.2	52.1	51.4	53.0
21:00 - 22:00	52.5	51.7	52.4	52.7	51.7	51.2	53.6
22:00 - 23:00	52.8	52.2	52.4	52.4	51.6	51.3	53.2
23:00 - 00:00	53.5	52.4	52.0	52.0	52.4	51.5	52.2
00:00 - 01:00	52.4	52.7	54.0	51.7	52.5	52.0	52.2
01:00 - 02:00	52.9	52.4	51.5	51.4	52.7	51.8	52.1
02:00 - 03:00	52.0	52.5	51.8	49.9	52.0	51.6	52.8
03:00 - 04:00	52.3	52.1	52.5	51.5	51.7	52.0	51.8
04:00 - 05:00	53.1	51.8	51.9	51.8	51.6	52.0	51.2
05:00 - 06:00	53.1	51.9	50.9	51.4	51.1	51.9	51.7
06:00 - 07:00	53.4	52.6	51.6	51.6	50.0	51.9	51.4
07:00 - 08:00	53.1	54.0	52.3	52.5	50.9	51.7	52.3
08:00 - 09:00	52.4	53.7	54.0	53.4	51.1	52.3	53.9
09:00 - 10:00	52.5	53.1	54.1	52.8	50.8	52.2	53.4
10:00 - 11:00	53.1	53.3	53.7	52.7	50.7	51.3	53.9
11:00 - 12:00	53.3	53.3	53.9	52.1	50.7	52.5	55.0
12:00 - 13:00	53.6	52.0	54.0	52.1	51.0	52.8	56.8
13:00 - 14:00	53.6	52.4	53.0	51.9	51.7	52.8	56.3
14:00 - 15:00	53.2	53.3	53.6	52.1	51.5	52.4	55.7
15:00 - 16:00	52.7	53.6	53.6	51.7	52.2	52.9	55.8
L90(avg)*	53.0	52.8	53.1	52.3	51.6	52.0	53.7

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 3 Monitor Period : 16-23 May 2023

SLM Model : RION NL-21

Serial No : 00187481

Site Operator : Mr. Siwanon Kulawong

Calibrator Model : RION NC-74

Serial No : 34283648

Calibration Ref dB(A) : 94.0

Certified Date : 13 Jan 2023

SLM Reading / Adjust dB(A) : 94.1/-0.1

Expire Date : 12 Jan 2024

Cal Sheet No.: NC-74-2023-026

Time	Equivalent Sound Pressure Level (dB(A))						
	16-17 May 2023	17-18 May 2023	18-19 May 2023	19-20 May 2023	20-21 May 2023	21-22 May 2023	22-23 May 2023
16:00 - 17:00	52.9	53.6	54.0	53.4	52.3	53.6	53.5
17:00 - 18:00	52.6	53.4	53.1	53.0	52.0	53.3	53.6
18:00 - 19:00	52.5	52.6	54.1	54.5	51.8	54.1	53.8
19:00 - 20:00	52.4	53.1	52.4	52.4	52.9	53.1	53.0
20:00 - 21:00	52.5	52.7	52.8	52.4	53.0	52.7	53.0
21:00 - 22:00	52.5	52.6	52.0	52.6	53.3	52.8	56.0
22:00 - 23:00	53.0	52.7	52.5	52.8	52.7	54.4	54.8
23:00 - 00:00	56.5	53.8	57.2	55.8	52.2	55.3	53.4
00:00 - 01:00	53.1	55.4	51.8	51.6	50.7	52.5	53.9
01:00 - 02:00	53.0	53.0	52.3	51.7	52.9	52.8	53.9
02:00 - 03:00	52.3	53.3	52.1	51.8	52.5	52.9	54.1
03:00 - 04:00	52.0	52.6	51.8	52.2	53.2	53.2	54.1
04:00 - 05:00	52.1	52.0	55.4	52.3	52.6	53.2	54.4
05:00 - 06:00	52.4	52.2	54.6	52.3	52.7	53.4	55.4
06:00 - 07:00	53.6	53.0	54.1	52.5	52.9	54.0	53.8
07:00 - 08:00	53.8	53.3	54.6	52.6	52.8	53.2	58.1
08:00 - 09:00	51.4	53.0	53.3	51.4	54.0	54.8	57.6
09:00 - 10:00	51.2	52.6	51.9	51.1	51.1	52.0	54.9
10:00 - 11:00	51.7	52.8	55.2	50.5	53.6	52.2	55.0
11:00 - 12:00	52.8	52.6	55.2	50.7	53.7	52.9	55.1
12:00 - 13:00	52.7	52.6	55.0	51.5	54.0	52.3	55.3
13:00 - 14:00	54.5	52.9	55.0	50.4	53.7	52.6	55.4
14:00 - 15:00	54.0	55.2	54.2	50.1	53.4	53.9	55.5
15:00 - 16:00	54.6	55.5	50.9	50.4	52.4	53.8	55.6

Leq(24)*	53.1	53.3	53.8	52.3	52.8	53.4	54.9
L _{dn}	59.7	59.7	60.3	59.1	59.0	60.0	60.8
L _{max} **	77.9	78.4	78.0	81.6	73.3	73.3	78.2

Standard-24Hr	70 dB(A)						
Standard-Max	115 dB(A)						

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 : Northern Refinery Boundary Station 3

Monitor Period : 16-23 May 2023

SLM Model : RION NL-21

Serial No : 00187481

Site Operator : Mr. Siwanon Kulawong

Calibrator Model : RION NC-74

Serial No : 34283648

Calibration Ref dB(A) : 94.0

Certified Date : 13 Jan 2023

SLM Reading / Adjust dB(A) : 94.1/-0.1

Expire Date : 12 Jan 2024

Cal Sheet No.: NC-74-2023-026

Time	L90 (dB(A))						
	16-17 May 2023	17-18 May 2023	18-19 May 2023	19-20 May 2023	20-21 May 2023	21-22 May 2023	22-23 May 2023
16:00 - 17:00	49.8	49.9	50.6	50.6	49.8	50.9	51.0
17:00 - 18:00	50.1	50.4	50.7	50.8	49.9	50.9	51.3
18:00 - 19:00	50.4	50.3	50.7	50.4	49.9	50.9	51.5
19:00 - 20:00	50.5	50.5	50.2	50.5	50.2	51.0	51.1
20:00 - 21:00	50.4	50.2	50.4	50.5	50.1	50.8	51.1
21:00 - 22:00	50.5	50.4	50.4	50.8	50.4	51.0	51.3
22:00 - 23:00	50.7	50.7	50.5	50.5	50.0	50.9	51.8
23:00 - 00:00	51.2	50.8	51.2	50.5	48.7	51.2	51.8
00:00 - 01:00	50.6	51.0	50.1	49.9	48.3	50.9	51.9
01:00 - 02:00	50.7	50.9	50.5	50.0	50.2	51.0	51.9
02:00 - 03:00	50.2	50.8	50.5	50.2	50.4	51.1	51.9
03:00 - 04:00	50.2	50.5	50.2	50.4	50.2	51.2	52.1
04:00 - 05:00	50.3	50.3	51.3	50.6	50.3	51.4	52.4
05:00 - 06:00	50.5	50.4	51.2	50.8	50.3	51.6	51.6
06:00 - 07:00	51.4	50.8	51.1	50.9	50.6	51.3	51.2
07:00 - 08:00	50.5	49.9	51.1	49.7	50.2	50.5	54.6
08:00 - 09:00	49.7	50.3	49.8	49.6	49.6	52.1	54.7
09:00 - 10:00	48.9	50.4	49.4	48.7	49.1	49.5	52.4
10:00 - 11:00	49.3	50.5	52.0	48.3	50.8	49.5	52.5
11:00 - 12:00	49.7	50.3	51.7	48.5	50.6	50.0	52.5
12:00 - 13:00	49.7	50.5	51.5	49.2	50.8	49.8	52.6
13:00 - 14:00	49.8	50.7	51.5	48.4	50.7	50.0	52.7
14:00 - 15:00	50.0	51.0	49.3	48.0	49.7	50.9	52.7
15:00 - 16:00	50.4	50.6	48.3	48.3	49.6	51.2	52.7

L90(avg)*	50.3	50.5	50.7	49.9	50.1	50.9	52.2
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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 Monitor Period : 16-23 May 2023
 SLM Model : RION NL-21 Serial No : 00487734
 Site Operator : Mr. Siwanon Kulawong

Calibrator Model : RION NC-74 Serial No : 34283648
 Calibration Ref dB(A) : 94.0 Certified Date : 13 Jan 2023
 SLM Reading / Adjust dB(A) : 93.6/0.4 Expire Date : 12 Jan 2024
 Cal Sheet No.: NC-74-2023-026

Time	Equivalent Sound Pressure Level (dB(A))						
	16-17 May 2023	17-18 May 2023	18-19 May 2023	19-20 May 2023	20-21 May 2023	21-22 May 2023	22-23 May 2023
14:00 - 15:00	60.4	59.1	65.5	58.1	58.8	59.2	60.1
15:00 - 16:00	63.6	61.6	68.9	60.1	58.1	59.0	58.7
16:00 - 17:00	64.5	64.6	63.7	61.7	58.4	60.3	59.2
17:00 - 18:00	63.5	64.6	63.0	64.9	62.0	61.7	60.3
18:00 - 19:00	62.1	62.7	62.3	64.1	62.7	63.6	63.0
19:00 - 20:00	61.5	62.5	62.6	62.7	64.2	64.7	63.7
20:00 - 21:00	58.3	59.9	61.2	61.6	63.0	63.6	62.5
21:00 - 22:00	60.0	60.8	58.1	59.8	61.8	61.7	61.7
22:00 - 23:00	58.0	58.5	58.8	60.2	58.6	60.8	60.6
23:00 - 00:00	56.8	56.4	55.8	56.4	60.7	60.2	57.9
00:00 - 01:00	56.7	52.2	52.0	56.5	59.6	58.1	57.4
01:00 - 02:00	55.6	52.9	53.2	55.0	57.5	56.9	55.3
02:00 - 03:00	54.5	52.2	52.7	54.7	59.0	56.0	53.3
03:00 - 04:00	57.0	58.5	56.2	53.2	57.6	56.0	52.4
04:00 - 05:00	58.0	57.3	55.9	52.6	54.4	55.1	53.1
05:00 - 06:00	63.5	62.9	62.5	56.6	56.9	54.4	52.1
06:00 - 07:00	65.2	65.2	65.1	61.9	57.6	55.9	54.7
07:00 - 08:00	62.0	62.2	63.0	63.8	62.1	62.5	59.0
08:00 - 09:00	59.7	59.1	60.9	63.8	62.3	64.9	64.3
09:00 - 10:00	60.1	60.6	58.9	60.0	59.8	62.0	64.9
10:00 - 11:00	61.2	61.4	60.4	60.6	59.4	59.4	61.6
11:00 - 12:00	60.2	61.1	60.5	60.2	61.6	60.1	60.0
12:00 - 13:00	59.6	61.2	60.5	59.5	59.1	60.5	59.3
13:00 - 14:00	58.9	60.2	60.9	60.4	60.8	60.9	60.7
Leq(24)*	60.9	61.1	61.9	60.7	60.4	60.8	60.4
Ldn	66.6	66.4	66.4	64.7	65.3	65.0	63.9
Lmax **	85.5	85.3	90.5	88.8	89.8	89.6	83.3

Standard-24Hr 70 dB(A)
 Standard-Max 115 dB(A)

Remark : * Average time between 14:00-14:00

** Maximum Sound Pressure Level between 14:00-14:00

(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 Monitor Period : 16-23 May 2023
 SLM Model : RION NL-21 Serial No : 00487734
 Site Operator : Mr. Siwanon Kulawong

Calibrator Model : RION NC-74 Serial No : 34283648
 Calibration Ref dB(A) : 94.0 Certified Date : 13 Jan 2023
 SLM Reading / Adjust dB(A) : 93.6/0.4 Expire Date : 12 Jan 2024
 Cal Sheet No.: NC-74-2023-026

Time	L90 (dB(A))						
	16-17 May 2023	17-18 May 2023	18-19 May 2023	19-20 May 2023	20-21 May 2023	21-22 May 2023	22-23 May 2023
14:00 - 15:00	50.9	50.6	53.4	49.1	50.6	50.0	52.8
15:00 - 16:00	54.8	51.5	53.7	50.6	50.2	50.0	51.2
16:00 - 17:00	57.7	56.9	57.4	51.1	50.9	50.6	51.7
17:00 - 18:00	56.6	55.9	56.1	57.4	52.3	52.6	51.6
18:00 - 19:00	54.2	53.7	54.7	55.9	54.9	54.6	56.0
19:00 - 20:00	50.9	51.9	52.1	54.1	54.6	54.9	57.5
20:00 - 21:00	48.8	49.7	50.6	52.7	51.9	53.5	55.1
21:00 - 22:00	50.6	49.2	49.8	49.6	50.7	52.2	52.2
22:00 - 23:00	50.1	49.2	49.3	48.7	49.6	49.9	50.2
23:00 - 00:00	50.6	49.5	49.6	47.9	50.0	49.3	49.7
00:00 - 01:00	49.6	48.7	47.9	46.7	49.1	49.3	49.1
01:00 - 02:00	49.3	48.4	48.1	46.6	50.0	48.4	48.8
02:00 - 03:00	48.6	48.4	48.2	48.0	49.4	48.4	48.0
03:00 - 04:00	49.0	49.5	47.0	46.9	48.7	47.9	45.9
04:00 - 05:00	50.3	50.4	47.7	46.6	48.6	48.6	45.7
05:00 - 06:00	54.8	54.5	52.0	47.5	48.3	48.7	45.5
06:00 - 07:00	57.6	57.8	58.7	51.6	49.1	49.4	46.4
07:00 - 08:00	53.1	54.5	55.0	56.6	52.5	53.4	49.6
08:00 - 09:00	50.8	51.2	52.0	53.7	51.7	57.7	56.8
09:00 - 10:00	50.9	51.7	51.5	50.5	49.3	53.1	56.3
10:00 - 11:00	51.9	51.7	51.7	49.5	50.7	51.1	53.1
11:00 - 12:00	52.1	51.8	51.7	51.2	50.8	51.1	52.0
12:00 - 13:00	50.9	52.1	51.8	51.6	51.6	52.2	52.8
13:00 - 14:00	50.7	51.0	50.2	51.3	51.3	53.3	53.0
L90(avg)*	52.8	52.6	52.8	51.9	51.1	52.0	52.6

Remark : * Average time between 14:00-14:00

(Miss Katesarin Vorradetwittaya)
 Environmental Scientist

Preeda S.
 (Miss Preeda Somjai)
 Technical Management Team



Noise Monitoring Result : Community Noise

MTR-SPRC PLC-Refinery

Location : Southern Refinery Boundary Station 1				Monitor Period : 16-23 May 2023			
SLM Model : RION NL-21				Serial No : 00521703			
Site Operator : Mr. Siwanon Kulawong							
Calibrator Model : RION NC-74				Serial No : 34283648			
Calibration Ref dB(A) : 94.0				Certified Date : 13 Jan 2023			
SLM Reading / Adjust dB(A) : 93.8/0.2				Expire Date : 12 Jan 2024			
Cal Sheet No.: NC-74-2023-026							
Time	Equivalent Sound Pressure Level (dB(A))						
	16-17 May 2023	17-18 May 2023	18-19 May 2023	19-20 May 2023	20-21 May 2023	21-22 May 2023	22-23 May 2023
14:00 - 15:00	57.4	58.6	57.8	61.4	57.5	57.4	62.5
15:00 - 16:00	58.9	60.3	58.4	58.9	57.7	57.6	60.9
16:00 - 17:00	59.6	61.2	60.2	60.8	57.9	58.3	60.7
17:00 - 18:00	60.4	61.5	60.5	62.0	60.1	59.4	57.3
18:00 - 19:00	60.9	61.3	62.6	61.9	61.2	59.9	55.7
19:00 - 20:00	60.7	60.8	62.1	62.3	62.0	59.9	56.3
20:00 - 21:00	57.1	57.6	58.0	61.8	60.9	60.7	56.0
21:00 - 22:00	56.3	56.1	57.3	58.6	59.9	60.9	54.3
22:00 - 23:00	56.4	56.5	56.8	57.7	57.0	56.1	53.3
23:00 - 00:00	56.0	55.6	57.9	56.7	56.1	54.4	53.1
00:00 - 01:00	55.0	53.1	55.1	56.3	55.9	54.9	54.8
01:00 - 02:00	55.5	53.2	55.0	55.2	56.0	55.9	57.7
02:00 - 03:00	54.7	54.2	54.8	55.4	55.2	52.5	59.6
03:00 - 04:00	55.2	55.1	54.9	55.6	52.5	53.0	60.8
04:00 - 05:00	57.7	56.7	56.8	55.5	52.5	54.2	60.0
05:00 - 06:00	58.5	59.6	59.3	57.0	54.7	54.5	58.4
06:00 - 07:00	60.0	60.6	59.4	59.5	57.2	57.1	58.5
07:00 - 08:00	58.6	59.4	59.9	62.0	59.2	59.5	59.9
08:00 - 09:00	56.9	57.0	58.9	61.3	60.7	61.4	59.1
09:00 - 10:00	57.1	57.3	59.4	58.7	60.0	60.8	59.1
10:00 - 11:00	57.2	57.8	59.4	57.8	56.2	58.4	60.3
11:00 - 12:00	57.5	57.9	59.0	58.3	56.9	57.8	59.3
12:00 - 13:00	58.3	56.9	58.6	58.1	58.3	60.4	59.5
13:00 - 14:00	57.2	57.0	58.9	57.7	57.9	60.5	59.5
Leq(24)*	58.0	58.4	58.8	59.4	58.3	58.5	58.8
Ldn	63.6	63.6	63.9	63.9	62.7	62.4	64.7
Lmax **	82.8	82.6	86.5	79.9	85.7	88.8	86.9
Standard-24Hr	70 dB(A)						
Standard-Max	115 dB(A)						

Remark : * Average time between 14:00-14:00

** Maximum Sound Pressure Level between 14:00-14:00

(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 : 16-23 May 2023			
SLM Model : RION NL-21				Serial No : 00521703			
Site Operator : Mr. Siwanon Kulawong							
Calibrator Model : RION NC-74				Serial No : 34283648			
Calibration Ref dB(A) : 94.0				Certified Date : 13 Jan 2023			
SLM Reading / Adjust dB(A) : 93.8/0.2				Expire Date : 12 Jan 2024			
Cal Sheet No.: NC-74-2023-026							
Time	L90 (dB(A))						
	16-17 May 2023	17-18 May 2023	18-19 May 2023	19-20 May 2023	20-21 May 2023	21-22 May 2023	22-23 May 2023
14:00 - 15:00	52.4	54.2	54.4	57.2	54.3	51.3	57.3
15:00 - 16:00	53.4	54.4	54.8	54.0	53.9	50.9	55.2
16:00 - 17:00	55.6	57.2	56.8	55.6	54.2	51.6	53.6
17:00 - 18:00	55.0	57.7	56.0	57.8	55.6	53.4	52.7
18:00 - 19:00	56.1	56.7	58.2	57.5	56.5	52.3	51.0
19:00 - 20:00	54.6	53.7	56.0	57.2	56.8	52.6	51.8
20:00 - 21:00	51.9	52.2	53.3	56.2	55.2	53.9	52.4
21:00 - 22:00	52.1	51.7	52.6	53.5	52.6	52.3	52.0
22:00 - 23:00	53.5	51.8	52.8	53.1	51.7	51.3	50.3
23:00 - 00:00	53.5	51.6	53.8	52.8	51.6	50.7	50.6
00:00 - 01:00	53.6	51.2	53.1	52.1	51.8	50.9	52.0
01:00 - 02:00	54.1	51.6	53.1	53.5	51.0	50.4	53.5
02:00 - 03:00	53.2	52.4	52.8	53.8	51.0	49.4	56.8
03:00 - 04:00	53.7	53.2	53.2	54.0	49.6	49.6	58.0
04:00 - 05:00	54.9	53.9	54.3	52.8	49.9	50.0	56.1
05:00 - 06:00	56.4	56.4	56.4	53.7	51.6	50.5	55.2
06:00 - 07:00	57.5	57.9	57.0	56.0	52.9	54.4	55.1
07:00 - 08:00	55.9	56.3	57.2	58.6	54.8	55.4	55.9
08:00 - 09:00	53.5	53.5	55.9	57.7	55.1	58.0	55.8
09:00 - 10:00	53.1	53.5	55.9	54.4	52.3	57.1	55.7
10:00 - 11:00	52.9	54.3	56.0	53.7	49.2	54.1	54.9
11:00 - 12:00	53.5	53.9	55.4	55.7	49.1	53.0	55.7
12:00 - 13:00	54.0	54.6	55.4	55.0	51.2	56.1	55.9
13:00 - 14:00	53.5	54.3	54.7	54.5	50.7	55.5	55.8
L90(avg)*	54.3	54.6	55.3	55.4	53.2	53.4	54.8

Remark : * Average time between 14:00-14:00

(Miss Katesarin Vorradetwittaya)
Environmental Scientist

Preeda S.
(Miss Preeda Somjai)
Technical Management Team



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

Location : Southern Refinery Boundary Station 2 Monitor Period : 16-23 May 2023
SLM Model : RION NL-21 Serial No : 00187511
Site Operator : Mr. Siwanon Kulawong

Calibrator Model : RION NC-74 Serial No : 34283648
Calibration Ref dB(A) : 94.0 Certified Date : 13 Jan 2023
SLM Reading / Adjust dB(A) : 93.7/0.3 Expire Date : 12 Jan 2024
Cal Sheet No.: NC-74-2023-026

Time	Equivalent Sound Pressure Level (dB(A))						
	16-17 May 2023	17-18 May 2023	18-19 May 2023	19-20 May 2023	20-21 May 2023	21-22 May 2023	22-23 May 2023
14:00 - 15:00	59.4	58.1	56.9	59.9	59.1	55.3	58.3
15:00 - 16:00	57.5	59.0	58.2	60.2	58.9	55.6	57.6
16:00 - 17:00	58.6	59.1	57.6	61.1	59.9	57.6	57.1
17:00 - 18:00	58.4	58.1	58.5	60.8	60.3	58.4	57.8
18:00 - 19:00	58.3	57.7	58.3	61.2	59.7	56.9	59.0
19:00 - 20:00	58.0	55.0	54.5	60.6	59.3	57.6	59.1
20:00 - 21:00	54.8	53.5	53.7	59.3	59.3	56.3	58.1
21:00 - 22:00	53.6	53.6	53.4	59.0	57.6	56.7	58.5
22:00 - 23:00	53.5	53.2	53.7	58.5	57.3	52.6	57.0
23:00 - 00:00	53.5	51.0	52.2	57.7	56.6	52.8	57.0
00:00 - 01:00	51.6	50.9	52.1	57.4	56.6	53.4	54.6
01:00 - 02:00	51.5	51.6	52.5	57.7	57.4	51.3	54.7
02:00 - 03:00	52.1	51.6	52.4	57.6	54.8	51.8	55.4
03:00 - 04:00	52.0	52.6	53.6	57.9	55.2	52.3	53.1
04:00 - 05:00	53.1	56.1	58.2	58.3	55.1	52.9	53.5
05:00 - 06:00	57.2	58.9	58.1	59.1	55.9	53.3	53.7
06:00 - 07:00	58.5	58.2	59.4	60.5	56.8	56.1	54.4
07:00 - 08:00	58.8	55.4	61.1	60.6	57.8	58.8	55.1
08:00 - 09:00	58.3	55.2	61.3	60.1	57.9	58.4	57.0
09:00 - 10:00	58.3	55.6	61.0	59.4	56.5	56.0	58.4
10:00 - 11:00	58.3	55.4	60.7	59.7	57.0	55.3	57.5
11:00 - 12:00	58.1	55.3	59.6	59.4	57.2	57.3	56.5
12:00 - 13:00	57.5	55.2	59.7	59.2	56.4	57.3	56.3
13:00 - 14:00	62.9	55.9	60.2	58.6	56.2	57.7	56.9
Leq(24)*	57.4	56.0	58.0	59.5	57.7	56.0	56.9
Ldn	61.7	61.6	62.7	65.1	63.1	60.4	61.9
Lmax **	90.8	76.5	75.4	75.5	77.9	82.8	76.9
Standard-24Hr	70 dB(A)						
Standard-Max	115 dB(A)						

Remark : * Average time between 14:00-14:00

** Maximum Sound Pressure Level between 14:00-14:00

(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 2 Monitor Period : 16-23 May 2023
SLM Model : RION NL-21 Serial No : 00187511
Site Operator : Mr. Siwanon Kulawong

Calibrator Model : RION NC-74 Serial No : 34283648
Calibration Ref dB(A) : 94.0 Certified Date : 13 Jan 2023
SLM Reading / Adjust dB(A) : 93.7/0.3 Expire Date : 12 Jan 2024
Cal Sheet No.: NC-74-2023-026

Time	L90 (dB(A))						
	16-17 May 2023	17-18 May 2023	18-19 May 2023	19-20 May 2023	20-21 May 2023	21-22 May 2023	22-23 May 2023
14:00 - 15:00	52.6	53.2	52.0	58.5	58.1	52.5	53.0
15:00 - 16:00	52.6	55.1	54.3	58.7	57.9	52.2	53.2
16:00 - 17:00	54.7	54.5	53.4	59.3	58.0	52.6	55.2
17:00 - 18:00	54.0	53.7	54.0	58.8	58.0	53.4	55.1
18:00 - 19:00	53.9	52.2	52.5	58.9	57.4	52.0	55.3
19:00 - 20:00	52.4	50.9	50.4	58.6	56.7	51.8	55.4
20:00 - 21:00	50.7	50.5	50.1	58.0	56.5	51.1	54.4
21:00 - 22:00	50.3	50.4	50.3	57.8	56.0	51.5	54.2
22:00 - 23:00	50.4	50.0	51.4	57.1	56.0	50.4	53.6
23:00 - 00:00	50.7	49.4	50.8	56.7	55.5	50.4	53.8
00:00 - 01:00	50.1	49.8	50.8	56.8	54.5	50.5	53.0
01:00 - 02:00	50.3	50.3	51.3	57.2	54.4	49.4	52.5
02:00 - 03:00	50.8	50.4	51.4	57.1	54.2	49.6	52.5
03:00 - 04:00	50.9	50.8	51.3	57.4	54.3	50.6	51.8
04:00 - 05:00	51.1	52.3	55.5	57.7	54.4	51.1	52.0
05:00 - 06:00	53.9	55.7	56.0	58.2	54.5	51.4	52.5
06:00 - 07:00	55.9	54.7	55.6	59.2	55.2	52.6	52.8
07:00 - 08:00	55.2	52.2	60.3	59.4	53.5	56.1	53.3
08:00 - 09:00	56.3	52.3	60.4	59.0	55.7	55.6	53.1
09:00 - 10:00	56.4	52.8	60.1	58.4	54.7	52.4	55.9
10:00 - 11:00	56.5	52.5	59.6	58.8	54.9	52.2	55.2
11:00 - 12:00	56.1	52.6	58.7	58.0	54.7	52.3	53.7
12:00 - 13:00	55.7	51.6	58.4	58.4	53.7	52.5	53.5
13:00 - 14:00	53.9	51.2	58.5	57.7	53.5	52.9	53.0
L90(avg)*	53.7	52.4	56.0	58.2	55.8	52.3	53.8

Remark : * Average time between 14:00-14:00

(Miss Katesarin Vorradetwittaya)
Environmental Scientist

Preeda S.
(Miss Preeda Somjai)
Technical Management Team



Noise Monitoring Result : Community Noise

MTR-SPRC PLC-Refinery

Location : Map Ta Phut New Town

Monitor Period : 16-23 May 2023

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 : 20 Dec 2022

SLM Reading / Adjust dB(A) : 93.7/0.2

Expire Date : 19 Dec 2023

Cal Sheet No.: CR-515-2023-073

Time	Equivalent Sound Pressure Level (dB(A))						
	16-17 May 2023	17-18 May 2023	18-19 May 2023	19-20 May 2023	20-21 May 2023	21-22 May 2023	22-23 May 2023
18:00 - 19:00	47.5	45.1	48.1	46.3	44.4	52.9	43.7
19:00 - 20:00	44.4	41.8	44.0	45.3	44.2	52.4	44.1
20:00 - 21:00	43.6	43.1	44.6	43.5	43.3	53.4	43.3
21:00 - 22:00	42.7	42.4	44.2	42.2	41.0	55.6	42.9
22:00 - 23:00	42.9	42.3	42.3	43.5	43.1	53.8	42.1
23:00 - 00:00	43.7	42.2	44.3	42.2	43.4	55.9	42.4
00:00 - 01:00	44.3	45.7	43.3	39.3	41.2	55.9	47.8
01:00 - 02:00	42.0	41.4	43.5	46.7	40.9	55.9	45.2
02:00 - 03:00	43.3	42.0	45.9	46.1	39.8	55.9	41.0
03:00 - 04:00	43.3	41.9	44.8	47.4	40.4	55.9	41.9
04:00 - 05:00	42.4	42.6	43.0	42.8	40.9	55.9	42.7
05:00 - 06:00	45.4	45.4	45.1	45.0	43.1	55.9	45.6
06:00 - 07:00	47.5	45.8	47.8	47.1	47.4	55.9	45.9
07:00 - 08:00	48.5	47.4	47.8	46.5	48.2	55.9	47.0
08:00 - 09:00	49.0	54.0	48.6	46.1	47.5	55.9	49.7
09:00 - 10:00	47.0	54.5	47.5	46.8	45.4	56.0	47.1
10:00 - 11:00	47.2	54.5	47.2	52.2	44.2	55.9	46.3
11:00 - 12:00	46.1	54.6	46.7	53.0	44.5	55.9	48.4
12:00 - 13:00	46.3	54.5	46.4	53.1	50.8	56.0	48.4
13:00 - 14:00	48.1	54.5	48.0	53.0	50.9	56.0	45.7
14:00 - 15:00	46.8	54.5	45.3	53.1	51.0	55.9	45.3
15:00 - 16:00	45.3	54.0	45.8	53.0	49.7	55.9	46.0
16:00 - 17:00	45.2	46.5	46.2	49.3	51.3	55.1	46.6
17:00 - 18:00	47.7	49.2	47.8	46.9	52.6	46.9	48.4
Leq(24)*	45.9	50.5	46.1	48.9	47.2	55.3	45.9
Ldn	51.1	52.8	51.5	52.7	50.7	62.0	51.2
Lmax **	76.8	66.4	72.0	70.2	75.0	71.2	70.2
Standard-24Hr	70 dB(A)						
Standard-Max	115 dB(A)						

Remark : * Average time between 18:00-18:00

** Maximum Sound Pressure Level between 18:00-18:00

(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 : 16-23 May 2023

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 : 20 Dec 2022

SLM Reading / Adjust dB(A) : 93.7/0.2

Expire Date : 19 Dec 2023

Cal Sheet No.: CR-515-2023-073

Time	L90 (dB(A))						
	16-17 May 2023	17-18 May 2023	18-19 May 2023	19-20 May 2023	20-21 May 2023	21-22 May 2023	22-23 May 2023
18:00 - 19:00	40.4	40.6	42.8	41.2	39.7	51.0	40.6
19:00 - 20:00	40.4	39.3	41.5	41.4	40.2	50.5	40.4
20:00 - 21:00	40.2	39.1	41.1	40.6	39.3	50.2	39.9
21:00 - 22:00	40.3	39.1	41.2	39.8	38.8	51.5	39.4
22:00 - 23:00	41.1	39.4	40.4	39.4	40.4	46.3	39.2
23:00 - 00:00	41.8	40.5	42.2	39.1	40.7	51.0	39.6
00:00 - 01:00	41.9	40.6	42.0	37.0	39.1	51.0	40.6
01:00 - 02:00	39.2	39.8	42.0	38.4	39.0	50.9	40.7
02:00 - 03:00	41.5	40.5	42.6	41.9	38.7	51.0	38.5
03:00 - 04:00	41.7	40.5	42.1	42.1	38.9	51.0	38.8
04:00 - 05:00	40.9	41.1	39.7	41.2	39.7	50.9	40.2
05:00 - 06:00	42.1	42.0	41.4	42.6	39.7	50.9	40.1
06:00 - 07:00	43.5	42.7	43.2	43.2	42.1	51.0	42.8
07:00 - 08:00	43.4	43.4	43.0	41.9	40.7	51.1	42.2
08:00 - 09:00	42.3	46.0	43.1	41.4	40.1	51.0	43.7
09:00 - 10:00	41.4	46.5	43.1	41.0	38.2	51.0	42.9
10:00 - 11:00	40.5	46.4	42.8	42.7	38.5	51.0	43.6
11:00 - 12:00	41.1	46.5	42.2	46.3	39.0	51.1	44.3
12:00 - 13:00	41.5	46.5	42.0	46.3	44.1	51.0	43.4
13:00 - 14:00	41.6	46.5	41.9	46.3	46.3	51.0	42.7
14:00 - 15:00	40.9	46.4	41.3	46.3	45.8	51.1	41.0
15:00 - 16:00	40.3	45.0	41.6	46.3	47.2	51.0	40.6
16:00 - 17:00	40.5	42.3	41.3	40.0	48.4	45.3	40.9
17:00 - 18:00	41.4	42.6	42.0	40.7	50.8	41.8	41.0
L90(avg)*	41.4	43.5	42.0	42.8	43.3	50.5	41.4

Remark : * Average time between 18:00-18:00

(Miss Katesarin Vorradetwittaya)
Environmental Scientist

Preeda S.
(Miss Preeda Somjai)
Technical Management Team



Noise Monitoring Result : Community Noise

MTR-SPRC PLC-Refinery

Location : Soi Ruam Patana Community
SLM Model : Cirrus CR162B
Site Operator : Mr. Siwanon Kulawong

Monitor Period : 16-23 May 2023
Serial No : G302740

Calibrator Model : Cirrus CR:515
Calibration Ref dB(A) : 94.0
SLM Reading / Adjust dB(A) : 93.7/0.2
Cal Sheet No.: CR-515-2023-073

Serial No : 94296
Certified Date : 20 Dec 2022
Expire Date : 19 Dec 2023

Time	Equivalent Sound Pressure Level (dB(A))						
	16-17 May 2023	17-18 May 2023	18-19 May 2023	19-20 May 2023	20-21 May 2023	21-22 May 2023	22-23 May 2023
17:00 - 18:00	54.7	57.0	59.2	57.8	54.0	51.4	52.0
18:00 - 19:00	53.9	63.6	68.4	55.1	51.9	53.9	50.6
19:00 - 20:00	56.2	59.4	58.1	51.7	50.1	47.7	47.4
20:00 - 21:00	56.2	54.6	55.0	56.2	47.4	47.0	47.9
21:00 - 22:00	50.0	51.6	54.3	48.0	47.3	49.0	49.4
22:00 - 23:00	47.7	48.1	48.6	47.8	54.5	46.4	46.8
23:00 - 00:00	49.9	54.0	51.2	52.7	47.8	46.7	44.5
00:00 - 01:00	59.2	61.3	54.4	48.4	48.4	44.1	43.6
01:00 - 02:00	52.2	57.9	47.1	47.0	51.6	48.8	47.7
02:00 - 03:00	50.3	51.4	45.7	45.7	55.2	54.6	52.5
03:00 - 04:00	46.2	46.9	56.4	43.5	56.2	56.2	53.6
04:00 - 05:00	48.0	52.4	50.5	49.0	54.2	55.9	56.0
05:00 - 06:00	54.7	54.5	56.5	57.9	61.9	62.7	59.6
06:00 - 07:00	57.8	56.2	59.4	60.3	64.3	55.3	59.7
07:00 - 08:00	55.4	58.0	59.2	58.0	56.6	54.4	59.8
08:00 - 09:00	61.0	57.7	59.0	54.0	57.4	57.4	70.5
09:00 - 10:00	45.9	52.3	59.2	53.5	54.3	59.7	64.7
10:00 - 11:00	52.1	51.9	55.7	71.6	60.2	62.7	59.1
11:00 - 12:00	54.1	54.6	57.1	63.4	65.0	56.4	58.5
12:00 - 13:00	52.1	55.2	54.3	56.9	61.1	57.1	57.8
13:00 - 14:00	51.5	52.3	51.9	61.8	60.8	61.8	57.6
14:00 - 15:00	52.3	54.4	51.0	60.8	55.9	55.9	59.7
15:00 - 16:00	54.5	54.4	52.4	59.3	56.5	54.4	63.7
16:00 - 17:00	55.0	54.6	58.5	54.3	55.1	50.7	54.2
Leq(24)*	54.6	56.5	58.3	60.3	58.1	56.6	60.1
Ldn	60.6	62.3	62.0	62.8	64.5	62.5	63.2
Lmax **	86.7	95.6	97.1	98.3	87.2	91.4	94.2
Standard-24Hr	70 dB(A)						
Standard-Max	115 dB(A)						

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
SLM Model : Cirrus CR162B
Site Operator : Mr. Siwanon Kulawong

Monitor Period : 16-23 May 2023
Serial No : G302740

Calibrator Model : Cirrus CR:515
Calibration Ref dB(A) : 94.0
SLM Reading / Adjust dB(A) : 93.7/0.2
Cal Sheet No.: CR-515-2023-073

Serial No : 94296
Certified Date : 20 Dec 2022
Expire Date : 19 Dec 2023

Time	L90 (dB(A))						
	16-17 May 2023	17-18 May 2023	18-19 May 2023	19-20 May 2023	20-21 May 2023	21-22 May 2023	22-23 May 2023
17:00 - 18:00	41.8	43.6	42.2	41.4	43.0	43.6	47.4
18:00 - 19:00	42.6	43.7	45.2	43.4	46.6	41.5	45.6
19:00 - 20:00	43.0	46.9	47.8	46.6	44.1	44.1	45.4
20:00 - 21:00	47.5	46.0	46.8	47.9	42.6	43.9	45.0
21:00 - 22:00	46.3	45.0	46.5	43.7	43.9	47.1	45.3
22:00 - 23:00	44.7	45.5	45.5	45.1	41.0	42.6	45.1
23:00 - 00:00	45.8	45.9	45.4	45.7	40.0	42.5	43.0
00:00 - 01:00	49.3	47.6	45.4	45.5	39.5	39.2	41.7
01:00 - 02:00	46.6	48.0	45.8	45.3	39.4	38.4	42.0
02:00 - 03:00	45.6	44.8	44.3	43.9	40.1	39.2	42.5
03:00 - 04:00	43.2	45.2	43.8	40.3	43.6	42.5	44.5
04:00 - 05:00	41.1	41.0	43.7	39.9	41.4	41.3	43.2
05:00 - 06:00	41.2	43.7	44.6	40.6	42.6	40.4	43.8
06:00 - 07:00	43.5	44.2	44.5	44.5	43.8	40.2	44.8
07:00 - 08:00	43.2	44.5	44.1	44.0	40.2	39.5	46.0
08:00 - 09:00	39.8	41.1	40.7	42.2	39.9	44.1	46.5
09:00 - 10:00	37.9	38.4	42.3	39.4	40.8	43.9	48.1
10:00 - 11:00	37.6	37.9	41.1	40.4	43.3	45.3	45.8
11:00 - 12:00	39.8	37.4	40.8	41.9	45.0	44.8	44.2
12:00 - 13:00	39.4	39.4	41.1	38.9	43.6	44.9	44.8
13:00 - 14:00	38.3	38.6	39.4	41.7	45.1	44.5	44.9
14:00 - 15:00	39.1	39.0	38.8	43.5	45.6	44.7	43.8
15:00 - 16:00	39.6	40.2	38.7	45.2	42.3	44.7	45.4
16:00 - 17:00	41.2	41.0	40.4	47.0	44.7	45.0	46.3
L90(avg)*	43.6	43.9	44.0	43.9	43.1	43.4	45.1

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

(Miss Katesarin Vorradetwittaya)
Environmental Scientist

Preeda S.
(Miss Preeda Somjai)
Technical Management Team



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

Location : Wat Sopphon Community Monitor Period : 16-23 May 2023
SLM Model : RION NL-21 Serial No : 00187497
Site Operator : Mr. Siwanon Kulawong

Calibrator Model : RION NC-74 Serial No : 34283648
Calibration Ref dB(A) : 94.0 Certified Date : 13 Jan 2023
SLM Reading / Adjust dB(A) : 93.6/0.4 Expire Date : 12 Jan 2024
Cal Sheet No.: NC-74-2023-026

Time	Equivalent Sound Pressure Level (dB(A))						
	16-17 May 2023	17-18 May 2023	18-19 May 2023	19-20 May 2023	20-21 May 2023	21-22 May 2023	22-23 May 2023
16:00 - 17:00	50.6	50.3	49.7	54.2	55.3	53.3	48.0
17:00 - 18:00	51.0	47.9	48.1	55.4	55.2	51.4	49.9
18:00 - 19:00	48.0	47.8	49.3	52.3	53.4	50.3	48.9
19:00 - 20:00	47.5	51.7	50.0	54.3	54.1	49.2	48.8
20:00 - 21:00	49.7	54.2	53.0	51.4	53.1	48.7	48.0
21:00 - 22:00	53.8	49.3	50.0	51.5	52.4	49.0	48.8
22:00 - 23:00	49.5	49.7	50.9	50.1	50.0	49.8	50.2
23:00 - 00:00	47.5	44.3	46.4	47.7	49.3	50.3	49.6
00:00 - 01:00	46.5	42.3	45.6	47.3	47.3	50.8	49.8
01:00 - 02:00	44.5	41.0	44.3	45.3	45.3	48.0	49.3
02:00 - 03:00	44.7	42.6	47.5	46.6	46.4	47.3	48.5
03:00 - 04:00	49.0	45.2	48.8	48.9	46.1	47.3	48.2
04:00 - 05:00	55.4	48.3	49.5	50.6	48.9	49.1	53.1
05:00 - 06:00	51.2	48.7	48.7	50.5	50.3	52.8	61.8
06:00 - 07:00	49.7	51.0	50.7	50.5	52.0	51.4	53.0
07:00 - 08:00	51.8	59.0	51.8	52.4	52.7	51.7	50.7
08:00 - 09:00	55.9	60.0	50.1	51.0	54.7	52.3	51.4
09:00 - 10:00	59.8	51.5	49.5	53.7	53.3	53.9	50.9
10:00 - 11:00	57.0	53.4	48.4	53.0	52.6	53.5	50.9
11:00 - 12:00	58.7	50.6	49.6	54.4	53.4	55.0	51.2
12:00 - 13:00	50.3	48.6	49.6	49.7	54.0	51.2	49.4
13:00 - 14:00	49.4	50.2	52.5	50.5	54.1	61.0	53.0
14:00 - 15:00	49.2	51.5	50.2	50.7	53.5	49.3	49.3
15:00 - 16:00	50.4	49.6	53.5	52.7	53.6	48.5	48.4
Leq(24)*	52.9	52.1	50.0	51.7	52.5	52.5	52.2
Ldn	57.3	55.3	55.3	56.2	56.4	57.1	60.3
Lmax **	80.0	77.8	76.7	80.5	79.0	81.7	75.7

Standard-24Hr 70 dB(A)
Standard-Max 115 dB(A)

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 : Wat Sopphon Community Monitor Period : 16-23 May 2023
SLM Model : RION NL-21 Serial No : 00187497
Site Operator : Mr. Siwanon Kulawong

Calibrator Model : RION NC-74 Serial No : 34283648
Calibration Ref dB(A) : 94.0 Certified Date : 13 Jan 2023
SLM Reading / Adjust dB(A) : 93.6/0.4 Expire Date : 12 Jan 2024
Cal Sheet No.: NC-74-2023-026

Time	L90 (dB(A))						
	16-17 May 2023	17-18 May 2023	18-19 May 2023	19-20 May 2023	20-21 May 2023	21-22 May 2023	22-23 May 2023
16:00 - 17:00	45.8	44.4	45.2	49.4	51.1	49.4	45.5
17:00 - 18:00	45.1	44.8	45.2	51.3	52.1	46.9	46.2
18:00 - 19:00	44.7	44.3	44.9	49.6	50.9	46.8	45.5
19:00 - 20:00	44.8	43.6	44.3	50.2	51.0	46.2	45.2
20:00 - 21:00	45.4	44.7	45.5	47.5	49.2	45.8	45.3
21:00 - 22:00	44.1	44.1	45.6	44.5	46.2	46.1	46.6
22:00 - 23:00	44.7	44.6	45.5	45.6	45.7	45.2	45.0
23:00 - 00:00	45.4	42.6	44.8	45.1	45.1	44.9	45.0
00:00 - 01:00	44.7	40.3	44.0	43.8	43.1	45.9	46.8
01:00 - 02:00	42.4	38.8	42.6	43.5	43.4	45.2	47.2
02:00 - 03:00	42.4	39.4	43.8	44.5	44.3	45.4	46.4
03:00 - 04:00	42.7	40.8	44.8	45.3	44.1	45.4	46.5
04:00 - 05:00	44.7	43.1	45.0	46.7	45.3	45.4	46.4
05:00 - 06:00	46.5	43.6	45.0	46.5	46.0	46.3	48.5
06:00 - 07:00	44.8	45.0	43.9	46.8	46.9	47.0	48.8
07:00 - 08:00	47.0	48.4	45.0	46.4	47.3	46.4	46.3
08:00 - 09:00	48.3	49.5	44.4	46.2	48.5	46.8	46.8
09:00 - 10:00	50.6	46.5	44.4	47.6	47.9	47.8	46.4
10:00 - 11:00	52.2	49.6	44.4	47.2	48.3	47.7	46.9
11:00 - 12:00	51.2	47.7	44.6	48.0	49.8	48.4	46.8
12:00 - 13:00	46.4	45.4	44.0	46.8	50.1	47.8	46.4
13:00 - 14:00	46.1	44.5	45.2	47.0	50.6	48.7	46.9
14:00 - 15:00	45.6	45.0	45.5	45.0	49.8	45.6	46.2
15:00 - 16:00	44.9	44.6	49.2	43.2	49.1	45.9	45.7
L90(avg)*	46.7	45.2	45.0	47.1	48.5	46.7	46.5

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

(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 29 พฤษภาคม 2566)

กลุ่ม/สกุลของแพลงก์ตอน	ปริมาณแพลงก์ตอน (หน่วยต่อลูกบาศก์เมตร)			
	S1	S2	S3	S4
แพลงก์ตอนพืช				
Division Cyanophyta				
Class Cyanophyceae				
Order Nostocales				
Family Oscillatoriaceae				
<i>Oscillatoria brevis</i>	-	-	28,000	-
<i>Oscillatoria planctonica</i>	-	-	226,000	-
<i>Oscillatoria</i> sp.	-	-	5,114,000	-
<i>Oscillatoria tenuis</i>	1,656,000	100,000	47,000	3,180,000
Family Nostocaceae				
<i>Pseudanabaena</i> sp.	147,000	50,000	-	212,000
Division Chlorophyta				
Class Chlorophyceae				
Order Volvocales				
Family Volvocaceae				
<i>Pandorina elegans</i>	-	-	28,000	-
Order Chlorococcales				
Family Hydrodictyaceae				
<i>Pediastrum duplex</i>	-	-	38,000	-

ตาราง ผลการวิเคราะห์แพลงก์ตอนพืชและแพลงก์ตอนสัตว์ (เก็บตัวอย่างวันที่ 29 พฤษภาคม 2566)

(ต่อ)

กลุ่ม/สกุลของแพลงก์ตอน	ปริมาณแพลงก์ตอน (หน่วยต่อลูกบาศก์เมตร)			
	S1	S2	S3	S4
<i>Pediastrum simplex</i>	-	-	19,000	-
Family Coelastraceae				
<i>Coelastrum microporum</i>	-	-	19,000	-
Family Oocystaceae				
<i>Oocystis parva</i>	-	10,000	-	-
Family Scenedesmaceae				
<i>Scenedesmus armatus</i>	-	-	-	32,000
<i>Scenedesmus dimorphus</i>	-	-	103,000	-
<i>Scenedesmus opoliensis</i>	-	20,000	94,000	-
Order Zygnematales				
Family Desmidiaceae				
<i>Cosmarium</i> sp.	-	-	9,000	-
<i>Staurostrum gracile</i>	-	30,000	-	-
Division Chromophyta				
Class Bacillariophyceae				
Order Biddulphales				
Suborder Coscinodiscineae				
Family Thalassiosiraceae				
<i>Cyclotella meneghiniana</i>	-	-	188,000	-
<i>Cyclotella striata</i>	83,000	239,000	-	498,000
<i>Lauderia annulata</i>	74,000	-	-	297,000
<i>Thalassiosira</i> sp.	28,000	60,000	-	-
Family Melosiraceae				
<i>Paralia sulcata</i>	55,000	-	-	-
Family Coscinodiscaceae				
<i>Coscinodiscus concinniformis</i>	9,000	-	-	42,000
<i>Coscinodiscus gigas</i>	9,000	-	-	11,000

ตาราง ผลการวิเคราะห์แพลงก์ตอนพืชและแพลงก์ตอนสัตว์ (เก็บตัวอย่างวันที่ 29 พฤษภาคม 2566)

กลุ่ม/สกุลของแพลงก์ตอน	(ต่อ)			
	ปริมาณแพลงก์ตอน (หน่วยต่อลูกบาศก์เมตร)			
	S1	S2	S3	S4
<i>Coscinodiscus radiatus</i>	92,000	-	-	32,000
<i>Coscinodiscus</i> sp.	46,000	-	19,000	-
Family Heliopeltaceae				
<i>Actinopterychus grundleri</i>	46,000	20,000	-	191,000
Suborder Rhizosoleniineae				
Family Rhizosoleniaceae				
<i>Dactyliosolen antarcticus</i>	9,000	-	-	64,000
<i>Dactyliosolen fragillissima</i>	-	-	-	117,000
<i>Guinardia flaccida</i>	-	-	-	32,000
<i>Guinardia striata</i>	9,000	-	-	191,000
<i>Proboscia alata</i>	9,000	-	-	42,000
<i>Pseudosolenia calcar-avis</i>	64,000	-	-	254,000
<i>Rhizosolenia imbricata</i>	9,000	-	-	-
<i>Rhizosolenia setigera</i>	46,000	40,000	-	456,000
<i>Rhizosolenia</i> sp.	37,000	-	-	-
<i>Rhizosolenia striata</i>	28,000	-	-	-
<i>Rhizosolenia styliformis</i>	9,000	-	-	-
Suborder Biddulphiineae				
Family Hemiaulaceae				
<i>Cerataulina bicornis</i>	110,000	100,000	-	636,000
<i>Cerataulina pelagica</i>	1,196,000	279,000	85,000	5,300,000
<i>Climacodium frauenfeldianum</i>	101,000	-	-	95,000
<i>Hemiaulus hauckii</i>	1,104,000	129,000	-	1,484,000
<i>Hemiaulus indicus</i>	294,000	30,000	-	498,000
Family Chaetoceraceae				
<i>Bacteriastrum delicatulum</i>	432,000	-	-	2,120,000
<i>Bacteriastrum elongatum</i>	9,000	-	-	-

ตาราง ผลการวิเคราะห์แพลงก์ตอนพืชและแพลงก์ตอนสัตว์ (เก็บตัวอย่างวันที่ 29 พฤษภาคม 2566)

กลุ่ม/สกุลของแพลงก์ตอน	(ต่อ)			
	ปริมาณแพลงก์ตอน (หน่วยต่อลูกบาศก์เมตร)			
	S1	S2	S3	S4
<i>Bacteriastrum furcatum</i>	258,000	149,000	-	6,784,000
<i>Bacteriastrum</i> sp.	-	30,000	-	1,113,000
<i>Chaetoceros affinis</i>	230,000	20,000	-	1,484,000
<i>Chaetoceros compressus</i>	184,000	40,000	-	2,120,000
<i>Chaetoceros costatus</i>	37,000	-	-	53,000
<i>Chaetoceros curvisetus</i>	754,000	517,000	226,000	10,664,000
<i>Chaetoceros debilis</i>	28,000	-	-	212,000
<i>Chaetoceros didymus</i>	276,000	80,000	-	1,272,000
<i>Chaetoceros diversus</i>	74,000	20,000	-	225,000
<i>Chaetoceros laciniosus</i>	18,000	-	-	1,166,000
<i>Chaetoceros lorenzianus</i>	239,000	70,000	-	2,332,000
<i>Chaetoceros mitra</i>	331,000	-	-	848,000
<i>Chaetoceros peruvianus</i>	552,000	40,000	-	2,173,000
<i>Chaetoceros pseudocurvisetus</i>	1,932,000	169,000	28,000	1,018,000
<i>Chaetoceros radicans</i>	147,000	-	-	1,378,000
<i>Chaetoceros rostratus</i>	-	-	-	441,000
<i>Chaetoceros</i> sp.	644,000	149,000	-	954,000
<i>Chaetoceros subtilis</i>	331,000	-	-	-
Family Lithodesmaceae				
<i>Ditylum sol</i>	9,000	-	-	-
Family Eupodiscaceae				
<i>Odontella aurita</i>	-	-	-	21,000
<i>Odontella mobiliensis</i>	9,000	-	-	-
<i>Odontella sinensis</i>	-	-	-	11,000

ตาราง ผลการวิเคราะห์แฟลงก์ตอนพืชและแฟลงก์ตอนสัตว์ (เก็บตัวอย่างวันที่ 29 พฤษภาคม 2566)

กลุ่ม/สกุลของแฟลงก์ตอน	(ต่อ)			
	ปริมาณแฟลงก์ตอน (หน่วยต่อลูกบาศก์เมตร)			
	S1	S2	S3	S4
Order Bacillariales				
Suborder Fragilariineae				
Family Fragilariaceae				
<i>Synedra ulna</i>	-	-	9,000	-
Family Thalassionemataceae				
<i>Thalassionema bacillare</i>	64,000	10,000	-	32,000
<i>Thalassionema frauenfeldii</i>	64,000	80,000	-	530,000
<i>Thalassiothrix</i> sp.	-	50,000	-	-
Family Tabellariaceae				
<i>Tabellaria fenestrata</i>	-	10,000	-	-
Family Licmophoriaceae				
<i>Licmophora abbreviata</i>	-	378,000	-	-
Suborder Bacillariineae				
Family Achnantheaceae				
<i>Achnanthes brevipes</i>	-	-	19,000	-
Family Naviculaceae				
<i>Amphora exigua</i>	9,000	70,000	-	11,000
<i>Amphora ovalis</i>	-	-	75,000	-
<i>Amphora robusta</i>	120,000	249,000	-	954,000
<i>Diploneis bombus</i>	9,000	-	-	-
<i>Gyrosigma attenuatum</i>	-	-	75,000	-
<i>Gyrosigma scalproides</i>	-	-	9,000	-
<i>Gyrosigma</i> sp.	-	-	9,000	-
<i>Navicula lanceolata</i>	9,000	-	19,000	11,000
<i>Navicula</i> sp.	-	10,000	-	-
<i>Pleurosigma aestuarii</i>	-	20,000	-	-
<i>Pleurosigma angulatum</i>	-	199,000	-	-

ตาราง ผลการวิเคราะห์แฟลงก์ตอนพืชและแฟลงก์ตอนสัตว์ (เก็บตัวอย่างวันที่ 29 พฤษภาคม 2566)

กลุ่ม/สกุลของแฟลงก์ตอน	(ต่อ)			
	ปริมาณแฟลงก์ตอน (หน่วยต่อลูกบาศก์เมตร)			
	S1	S2	S3	S4
<i>Pleurosigma elongatum</i>	-	109,000	-	-
<i>Pleurosigma narmanii</i>	28,000	-	-	74,000
<i>Pleurosigma</i> sp.	-	119,000	-	-
<i>Trachyneis</i> sp.	-	-	-	148,000
Family Bacillariaceae				
<i>Cylindrotheca closterium</i>	101,000	30,000	-	42,000
<i>Nitzschia acicularis</i>	-	-	47,000	-
<i>Pseudo-nitzschia</i> sp.	18,000	-	-	64,000
Class Dinophyceae				
Order Prorocentrales				
Family Prorocentraceae				
<i>Prorocentrum mexicanum</i>	110,000	50,000	28,000	-
<i>Prorocentrum micans</i>	110,000	10,000	-	85,000
<i>Prorocentrum sigmoides</i>	37,000	-	-	11,000
Order Gonyaulacalea				
Family Ceratiaceae				
<i>Ceratium fusus</i>	9,000	-	-	-
<i>Ceratium macroceros</i>	9,000	-	-	21,000
Family Gonyaulacaceae				
<i>Gonyaulax</i> sp.	83,000	10,000	-	-
Family Pyrophacaceae				
<i>Pyrophacus horologium</i>	18,000	-	-	11,000
Order Peridiniales				
Family Calciodinellaceae				
<i>Scrippsiella trocoidea</i>	221,000	90,000	-	85,000

ตาราง ผลการวิเคราะห์แพลงก์ตอนพืชและแพลงก์ตอนสัตว์ (เก็บตัวอย่างวันที่ 29 พฤษภาคม 2566)

กลุ่ม/สกุลของแพลงก์ตอน	ปริมาณแพลงก์ตอน (หน่วยต่อลูกบาศก์เมตร)			
	S1	S2	S3	S4
(ต่อ)				
Family Peridiniaceae				
<i>Peridinium cunningtonii</i>	-	-	38,000	-
<i>Peridinium quinquecorne</i>	460,000	2,348,000	263,000	106,000
<i>Peridinium</i> sp.	-	-	263,000	-
Family Protoperidiniaceae				
<i>Protoperidinium angustum</i>	9,000	50,000	-	42,000
<i>Protoperidinium conicum</i>	-	20,000	-	-
<i>Protoperidinium curtipes</i>	101,000	10,000	-	170,000
<i>Protoperidinium latispinum</i>	18,000	-	-	21,000
<i>Protoperidinium oceanicum</i>	9,000	10,000	-	11,000
<i>Protoperidinium</i> sp.	129,000	-	-	127,000
<i>Protoperidinium spinulosum</i>	9,000	-	-	-
<i>Protoperidinium thorianum</i>	9,000	-	-	-
แพลงก์ตอนสัตว์				
Phylum Protozoa				
Subphylum Ciliophora				
Class Ciliata				
Subclass Spirotricha				
Order Tintinnida				
Family Codonellidae				
<i>Codonella inflata</i>	18,000	-	-	11,000
<i>Tintinnopsis meunieri</i>	18,000	10,000	19,000	-
Family Codonellopsidae				
<i>Stenosemella nivalis</i>	-	-	-	21,000
Family Petalotrichidae				
<i>Metacylis pithos</i>	9,000	-	-	11,000

ตาราง ผลการวิเคราะห์แพลงก์ตอนพืชและแพลงก์ตอนสัตว์ (เก็บตัวอย่างวันที่ 29 พฤษภาคม 2566)


กลุ่ม/สกุลของแพลงก์ตอน	ปริมาณแพลงก์ตอน (หน่วยต่อลูกบาศก์เมตร)			
	S1	S2	S3	S4
(ต่อ)				
Family Tintinnidae				
<i>Eutintinnus fraknoi</i>	-	-	19,000	11,000
Subclass Peritricha				
Order Peritrichida				
<i>Vorticella</i> sp.	-	-	-	64,000
Phylum Rotifera				
Class Monogononta				
Order Ploima				
Family Brachionidae				
<i>Brachionus plicatilis</i>	-	10,000	-	-
Family Lecanidae				
<i>Lecane bulla</i>	-	-	19,000	-
<i>Lecane inopinata</i>	-	-	9,000	-
Phylum Annelida				
Class Polychaeta				
Polychaete larvae	9,000	20,000	9,000	11,000
Phylum Arthropoda				
Class Crustacea				
Subclass Copepoda				
Copepod nauplii	175,000	169,000	56,000	42,000
Order Calanoida				
Calanoid copepod	9,000	-	-	32,000
Order Cyclopoida				
Cyclopoid copepod	9,000	30,000	-	-
Phylum Mollusca				
Class Bivalvia				
Pelecypod larvae	9,000	20,000	-	-

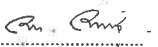
ตาราง ผลการวิเคราะห์แพลงก์ตอนพืชและแพลงก์ตอนสัตว์ (เก็บตัวอย่างวันที่ 29 พฤษภาคม 2566)

(ต่อ)

กลุ่ม/สกุลของแพลงก์ตอน	ปริมาณแพลงก์ตอน (หน่วยต่อลูกบาศก์เมตร)			
	S1	S2	S3	S4
Phylum Chordata				
Subphylum Urochordata				
Class Larvacea				
Family Oikopleuridae				
<i>Oikopleura</i> sp.	28,000	10,000	19,000	32,000
ชนิดของแพลงก์ตอนพืช	70	46	28	61
ชนิดของแพลงก์ตอนสัตว์	9	7	7	9
ชนิดแพลงก์ตอนรวม	79	53	35	70
ปริมาณแพลงก์ตอนพืช	13,527,000	6,323,000	7,125,000	52,609,000
ปริมาณแพลงก์ตอนสัตว์	284,000	269,000	150,000	235,000
ปริมาณแพลงก์ตอนรวม	13,811,000	6,592,000	7,275,000	52,844,000
ค่าดัชนีความหลากหลายของแพลงก์ตอนพืช	3.2502	2.7241	1.3854	2.9937
ค่าดัชนีความหลากหลายของแพลงก์ตอนสัตว์	1.4234	1.2903	1.7523	1.9941
ค่าดัชนีความสม่ำเสมอของแพลงก์ตอนพืช	0.7650	0.7115	0.4158	0.7282
ค่าดัชนีความสม่ำเสมอของแพลงก์ตอนสัตว์	0.6478	0.6631	0.9005	0.9076

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


(นางสาวกนกวรรณ ขวาค้อน)
ผู้วิเคราะห์


(นายอลงกต อินทรชาติ)
หัวหน้าสถานีวิจัยประมงศรีราชา



สถานีวิจัยประมงศรีราชา

101/12 หมู่ 9 ต. บางพระ

อ. ศรีราชา จ. ชลบุรี 20110

โทร./โทรสาร. (038) 311379

รายงานผลการวิเคราะห์สัตว์หน้าดิน

ตาราง ผลการวิเคราะห์สัตว์หน้าดิน (เก็บตัวอย่างวันที่ 29 พฤษภาคม 2566)

ชนิดสัตว์หน้าดิน	ปริมาณสัตว์หน้าดิน (ตัวต่อตารางเมตร)			
	S1	S2	S3	S4
Phylum Annelida				
Class Polychaeta				
Order Capitellida				
Family Capitellidae				
<i>Heteromastus</i> sp. (ไส้เดือนทะเล)	15	45	-	-
Family Maldanidae				
<i>Euclymene</i> sp. (ไส้เดือนทะเล)	15	-	-	-
Order Eunicida				
Family Eunicidae				
<i>Marphysa</i> sp. (ไส้เดือนทะเล)	60	-	-	-
Order Opheliida				
Family Opheliidae				
<i>Armandia</i> sp. (ไส้เดือนทะเล)	-	15	-	-
Order Orbiniida				
Family Orbiniidae				
<i>Scoloplos</i> sp. (ไส้เดือนทะเล)	45	297	75	-

ตาราง ผลการวิเคราะห์สัตว์หน้าดิน (เก็บตัวอย่างวันที่ 29 พฤษภาคม 2566) (ต่อ)

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

ชนิดสัตว์หน้าดิน	ปริมาณสัตว์หน้าดิน (ตัวต่อตารางเมตร)			
	S1	S2	S3	S4
Order Phyllodocida				
Family Glyceridae				
<i>Glycera</i> sp. (ไส้เดือนทะเล)	15	-	-	-
Family Nephtyidae				
<i>Nephtys</i> sp. (ไส้เดือนทะเล)	30	-	-	15
Family Nereididae				
<i>Dendronereis</i> sp. (ไส้เดือนทะเล)	-	-	15	-
<i>Nereis</i> sp. (แม่เพรียง)	-	30	-	-
Order Spionida				
Family Spionidae				
<i>Magelona</i> sp. (ไส้เดือนทะเล)	-	-	-	15
Phylum Mollusca				
Class Bivalvia				
Order Cardiida				
Family Tellinidae				
<i>Tellina</i> sp. (หอยสองฝาชนิดหนึ่ง)	-	45	45	15
Order Venerida				
Family Veneridae				
<i>Pitar</i> sp. (หอยสองฝาชนิดหนึ่ง)	-	-	238	-
Phylum Chordata				
Class Leptocardii				
Order Amphioxiformes				
Family Branchiostomidae				
<i>Branchiostoma</i> sp. (แอมฟิออกซัส)	-	-	-	60
ชนิดสัตว์หน้าดิน	6	5	4	4
ปริมาณสัตว์หน้าดิน	180	432	373	105
ค่าดัชนีความหลากหลายสัตว์หน้าดิน	1.6326	1.0307	0.9936	1.1537

.....
 (นายอรรถวุฒิ กันทะวงษ์)
 ผู้วิเคราะห์

.....
 (นายอลงกต อินทราชาติ)
 หัวหน้าสถานีวิจัยประมงศรีราชา

ใบรับรองผลการตรวจวัดคุณภาพน้ำใต้ดิน



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SECOT CO., LTD.

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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	: 0486/66
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Pneumatic Bladder Pump
SAMPLING DATE	: 20-21/03/2023	SAMPLING TIME	: 11:14-11:27, 14:13-14:25
RECEIVED DATE	: 25/03/2023	ANALYTICAL DATE	: 27-28/03/2023
REPORT DATE	: 01/04/2023	SITE OPERATOR	: Mr. Aniwat Pimwhanna
SAMPLE CONDITION	: Normal	FILE CODE	: 223003_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	0.02	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 21st ED. 2017 (AWWA APHA, WEF)

(Miss Krisana Chanthoom)

Analyst

REG. NO. 7-239-ก-7802

(Mrs. Araya Tipparuk)

Technical Management Team

REG. NO. 7-239-ก-5863

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GROUND WATER ANALYSIS REPORT

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REPORT DATE	: 01/04/2023	SITE OPERATOR	: Mr. Aniwat Pimwhanna
SAMPLE CONDITION	: Normal	FILE CODE	: 223003_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 21st ED. 2017 (AWWA APHA, WEF)

(Miss Jutarat Jaemruen)

Analyst

REG. NO. 7-239-ก-5827

(Mrs. Araya Tipparuk)

Technical Management Team

REG. NO. 7-239-ก-5863

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SAMPLE CONDITION	: Normal	FILE CODE	: 223003_GW_March

PARAMETER	UNIT	ANALYSIS METHODS	ND (non-detectable)	STATION		STANDARD 1/
				MW-101B	MW-102A	
Total Petroleum Hydrocarbon						
- TPH (C ₅ - C ₉)	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-Tetatriacontane						
- Pentatriacontane						

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

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(Miss Sudaporn Soonthorn)

Analyst

REG. NO. 2-239-ก-0001

(Mrs. Araya Tipparuk)

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Technical Management Team

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GROUND WATER ANALYSIS REPORT

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SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Pneumatic Bladder Pump
SAMPLING DATE	: 20/03/2023	SAMPLING TIME	: 10:31-10:39, 10:01-10:06
RECEIVED DATE	: 25/03/2023	ANALYTICAL DATE	: 27-28/03/2023
REPORT DATE	: 01/04/2023	SITE OPERATOR	: Mr. Aniwat Pimwhanna
SAMPLE CONDITION	: Normal	FILE CODE	: 223003_GW_March

PARAMETER	UNIT	ANALYSIS METHODS	ND (non-detectable)	STATION		STANDARD ^{1/}
				MW-103A	MW-104A	
Chromium (Cr)	mg/l	3120 B	< 0.001	< 0.01	< 0.01	≤ 6.0
Manganese (Mn)	mg/l	3120 B	< 0.001	< 0.01	0.07	≤ 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 21st ED. 2017 (AWWA, APHA, WEF)

(Miss Krisana Chanthoom)

(Miss Krisana Chanthoom)

Analyst

REG. NO. 2-239-ก-7802

(Mrs. Araya Tipparuk)

(Mrs. Araya Tipparuk)

Technical Management Team

REG. NO. 2-239-ก-5863

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GROUND WATER ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No. :	0486/66
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Pneumatic Bladder Pump
SAMPLING DATE	: 20/03/2023	SAMPLING TIME	: 10:31-10:39, 10:01-10:06
RECEIVED DATE	: 25/03/2023	ANALYTICAL DATE	: 29-30/03/2023
REPORT DATE	: 01/04/2023	SITE OPERATOR	: Mr. Aniwat Pimwhanna
SAMPLE CONDITION	: Normal	FILE CODE	: 223003_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 21st ED. 2017 (AWWA APHA, WEF)

Jutarat Jaemruen

(Miss Jutarat Jaemruen)

Analyst

REG. NO. 2-239-0-5827

Araya Tipparuk

(Mrs. Araya Tipparuk)

Technical Management Team

REG. NO. 2-239-0-5863

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GROUND WATER ANALYSIS REPORT

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SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Pneumatic Bladder Pump
SAMPLING DATE	: 20/03/2023	SAMPLING TIME	: 10:31-10:39, 10:01-10:06
RECEIVED DATE	: 25/03/2023	ANALYTICAL DATE	: 29-30/03/2023
REPORT DATE	: 01/04/2023	SITE OPERATOR	: Mr. Aniwat Pimwhanna
SAMPLE CONDITION	: Normal	FILE CODE	: 223003_GW_March

PARAMETER	UNIT	ANALYSIS	ND	STATION		STANDARD ¹
		METHODS	(non-detectable)	MW-103A	MW-104A	
Total Petroleum Hydrocarbon						
- TPH (C ₅ - C ₉)	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 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, WEF)

Sudaporn Soonthorn

(Miss Sudaporn Soonthorn)

Analyst

REG. NO. 2-239-0-0001

Araya Tipparuk

(Mrs. Araya Tipparuk)

Technical Management Team

REG. NO. 2-239-0-5863

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

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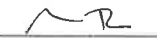
GROUND WATER ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No	: 0486/66
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Pneumatic Bladder Pump
SAMPLING DATE	: 21/03/2023	SAMPLING TIME	: 09:22-09:30, 09:49-09:55
RECEIVED DATE	: 25/03/2023	ANALYTICAL DATE	: 27-28/03/2023
REPORT DATE	: 01/04/2023	SITE OPERATOR	: Mr. Aniwat Pimwhanna
SAMPLE CONDITION	: Normal	FILE CODE	: 223003_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	< 0.01	≤ 6.0
Manganese (Mn)	mg/l	3120 B	< 0.001	2.93	0.37	≤ 33
Mercury (Hg)	mg/l	3112 B	< 0.0001	ND	ND	≤ 0.7
Nickel (Ni)	mg/l	3120 B	< 0.002	< 0.01	< 0.01	≤ 5.0

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


(Miss Krisana Chanthoom)
Analyst
REG. NO. 2-239-ก-7802


(Mrs. Araya Tipparuk)
Technical Management Team
REG. NO. 2-239-ก-5863

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GROUND WATER ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No	: 0486/66
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Pneumatic Bladder Pump
SAMPLING DATE	: 21/03/2023	SAMPLING TIME	: 09:22-09:30, 09:49-09:55
RECEIVED DATE	: 25/03/2023	ANALYTICAL DATE	: 29-30/03/2023
REPORT DATE	: 01/04/2023	SITE OPERATOR	: Mr. Aniwat Pimwhanna
SAMPLE CONDITION	: Normal	FILE CODE	: 223003_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 21st ED. 2017 (AWWA APHA WEF)


(Miss Jutarat Jaemruen)
Analyst
REG. NO. 2-239-ก-5827


(Mrs. Araya Tipparuk)
Technical Management Team
REG. NO. 2-239-ก-5863

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GROUND WATER ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No	: 0486/66
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Pneumatic Bladder Pump
SAMPLING DATE	: 21/03/2023	SAMPLING TIME	: 09:22-09:30, 09:49-09:55
RECEIVED DATE	: 25/03/2023	ANALYTICAL DATE	: 29-30/03/2023
REPORT DATE	: 01/04/2023	SITE OPERATOR	: Mr. Aniwat Pimwhanna
SAMPLE CONDITION	: Normal	FILE CODE	: 223003_GW_March

PARAMETER	UNIT	ANALYSIS METHODS	ND (non-detectable)	STATION		STANDARD ^{1/}
				MW-105B	MW-106B	
Total Petroleum Hydrocarbon						
- TPH (C ₅ - C ₉)	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-Tetracontane						
- Pentatriacontane						

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

Sudaporn Soonthorn

(Miss Sudaporn Soonthorn)

Analyst

REG. NO. 7-239-ก-0001

Araya Tipparuk

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Technical Management Team

REG. NO. 7-239-ก-5863

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GROUND WATER ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No	: 0486/66
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Pneumatic Bladder Pump
SAMPLING DATE	: 21-22/03/2023	SAMPLING TIME	: 14:13-14:30, 09:59-10:05
RECEIVED DATE	: 25/03/2023	ANALYTICAL DATE	: 27-28/03/2023
REPORT DATE	: 01/04/2023	SITE OPERATOR	: Mr. Aniwat Pimwhanna
SAMPLE CONDITION	: Normal	FILE CODE	: 223003_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	< 0.01	≤ 6.0
Manganese (Mn)	mg/l	3120 B	< 0.001	0.30	0.22	≤ 33
Mercury (Hg)	mg/l	3112 B	< 0.0001	ND	ND	≤ 0.7
Nickel (Ni)	mg/l	3120 B	< 0.002	< 0.01	< 0.01	≤ 5.0

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

Krisana Chanthoom

(Miss Krisana Chanthoom)

Analyst

REG. NO. 7-239-ก-7802

Araya Tipparuk

(Mrs. Araya Tipparuk)

Technical Management Team

REG. NO. 7-239-ก-5863

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GROUND WATER ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No.	: 0486/66
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Pneumatic Bladder Pump
SAMPLING DATE	: 21-22/03/2023	SAMPLING TIME	: 14:13-14:30, 09:59-10:05
RECEIVED DATE	: 25/03/2023	ANALYTICAL DATE	: 29-30/03/2023
REPORT DATE	: 01/04/2023	SITE OPERATOR	: Mr. Aniwat Pimwhanna
SAMPLE CONDITION	: Normal	FILE CODE	: 223003_GW_March

PARAMETER	UNIT	ANALYSIS METHODS	ND (non-detectable)	STATION		STANDARD ^{1/}
				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 21st ED. 2017 (AWWA APHA, WEF)

Jutarat Jaemruen

(Miss Jutarat Jaemruen)

Analyst

REG. NO. 7-239-8-5827

(Mrs. Araya Tipparuk)

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Technical Management Team

REG. NO. 7-239-8-5863

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GROUND WATER ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No.	: 0486/66
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Pneumatic Bladder Pump
SAMPLING DATE	: 21-22/03/2023	SAMPLING TIME	: 14:13-14:30, 09:59-10:05
RECEIVED DATE	: 25/03/2023	ANALYTICAL DATE	: 29-30/03/2023
REPORT DATE	: 01/04/2023	SITE OPERATOR	: Mr. Aniwat Pimwhanna
SAMPLE CONDITION	: Normal	FILE CODE	: 223003_GW_March

PARAMETER	UNIT	ANALYSIS	ND	STATION		STANDARD ^{1/}
		METHODS	(non-detectable)	MW-107C	MW-108B	
Total Petroleum Hydrocarbon						
- TPH (C ₅ - C ₉)	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-Tetracontane						
- Pentatriacontane						

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

Sudaporn Soonthorn

(Miss Sudaporn Soonthorn)

Analyst

REG. NO. 7-239-8-0001

(Mrs. Araya Tipparuk)

(Mrs. Araya Tipparuk)

Technical Management Team

REG. NO. 7-239-8-5863

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GROUND WATER ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No	: 0486/66
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Pneumatic Bladder Pump
SAMPLING DATE	: 23-24/03/2023	SAMPLING TIME	: 09:55-10:01, 15:00-15:11
RECEIVED DATE	: 25/03/2023	ANALYTICAL DATE	: 27-28/03/2023
REPORT DATE	: 01/04/2023	SITE OPERATOR	: Mr. Aniwat Pimwhanna
SAMPLE CONDITION	: Normal	FILE CODE	: 223003_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	< 0.01	≤ 6.0
Manganese (Mn)	mg/l	3120 B	< 0.001	0.20	0.26	≤ 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 21st ED. 2017 (AWWA, APHA, WEF)

(Miss Krisana Chanthoom)

Analyst

REG. NO. 7-239-9-7802

(Mrs. Araya Tipparuk)

Technical Management Team

REG. NO. 7-239-9-5863

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GROUND WATER ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No. :	0486/66
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Pneumatic Bladder Pump
SAMPLING DATE	: 23-24/03/2023	SAMPLING TIME	: 09:55-10:01, 15:00-15:11
RECEIVED DATE	: 25/03/2023	ANALYTICAL DATE	: 29-30/03/2023
REPORT DATE	: 01/04/2023	SITE OPERATOR	: Mr. Aniwat Pimwhanna
SAMPLE CONDITION	: Normal	FILE CODE	: 223003_GW_March

PARAMETER	UNIT	ANALYSIS METHODS	ND (non-detectable)	STATION		STANDARD ^{1/}
				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)

(Miss Jutarat Jaemruen)

Analyst

REG. NO. 7-239-9-5827

(Mrs. Araya Tipparuk)

Technical Management Team

REG. NO. 7-239-9-5863

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GROUND WATER ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No	: 0486/66
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Pneumatic Bladder Pump
SAMPLING DATE	: 23-24/03/2023	SAMPLING TIME	: 09:55-10:01, 15:00-15:11
RECEIVED DATE	: 25/03/2023	ANALYTICAL DATE	: 29-30/03/2023
REPORT DATE	: 01/04/2023	SITE OPERATOR	: Mr. Aniwat Pimwhanna
SAMPLE CONDITION	: Normal	FILE CODE	: 223003_GW_March

PARAMETER	UNIT	ANALYSIS	ND	STATION		STANDARD ^{1/}
		METHODS	(non-detectable)	MW-109A	MW-111A	
Total Petroleum Hydrocarbon						
- TPH (C ₅ - C ₉)	mg/l	5030 C/8260 D	< 0.003	ND	ND	≤ 1.4
- Pentane						
- Benzene						
- Toluene						
- m,p-Xylene						
- o-Xylene						
- Ethylbenzene						
- TPH (C ₈₋₈ - 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 ₃₂)	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-Tetatriacontane						
- Pentatriacontane						

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

Sudaporn Soonthorn

(Miss Sudaporn Soonthorn)

Analyst

REG. NO. 7-239-9-0001

(Mrs. Araya Tipparuk)

Technical Management Team

REG. NO. 7-239-9-5863

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GROUND WATER ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No	: 0486/66
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Pneumatic Bladder Pump
SAMPLING DATE	: 22-23/03/2023	SAMPLING TIME	: 14:32-14:40, 14:14-14:20
RECEIVED DATE	: 25/03/2023	ANALYTICAL DATE	: 27-28/03/2023
REPORT DATE	: 01/04/2023	SITE OPERATOR	: Mr. Aniwat Pimwhanna
SAMPLE CONDITION	: Normal	FILE CODE	: 223003_GW_March

PARAMETER	UNIT	ANALYSIS	ND (non-detectable)	STATION		STANDARD ^{1/}
		METHODS		MW-112A	MW-113A	
Chromium (Cr)	mg/l	3120 B	< 0.001	ND	ND	≤ 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	< 0.01	< 0.01	≤ 5.0

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

(Miss Krisana Chanthoom)

Analyst

REG. NO. 7-239-9-7802

(Mrs. Araya Tipparuk)

Technical Management Team

REG. NO. 7-239-9-5863

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GROUND WATER ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No.	: 0486/66
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Pneumatic Bladder Pump
SAMPLING DATE	: 22-23/03/2023	SAMPLING TIME	: 14:32-14:40, 14:14-14:20
RECEIVED DATE	: 25/03/2023	ANALYTICAL DATE	: 29-30/03/2023
REPORT DATE	: 01/04/2023	SITE OPERATOR	: Mr. Aniwat Pimwhanna
SAMPLE CONDITION	: Normal	FILE CODE	: 223003_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 3rd ED. 2017 (AWWA APHA WEF)

Jutarat Jaemruen

(Miss Jutarat Jaemruen)

Analyst

REG. NO. 7-239-ก-5827

Araya Tipparuk

(Mrs. Araya Tipparuk)

Technical Management Team

REG. NO. 7-239-ก-5863

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GROUND WATER ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No.	: 0486/66
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Pneumatic Bladder Pump
SAMPLING DATE	: 22-23/03/2023	SAMPLING TIME	: 14:32-14:40, 14:14-14:20
RECEIVED DATE	: 25/03/2023	ANALYTICAL DATE	: 29-30/03/2023
REPORT DATE	: 01/04/2023	SITE OPERATOR	: Mr. Aniwat Pimwhanna
SAMPLE CONDITION	: Normal	FILE CODE	: 223003_GW_March

PARAMETER	UNIT	ANALYSIS	ND	STATION		STANDARD ^{1/}
		METHODS	(non-detectable)	MW-112A	MW-113A	
Total Petroleum Hydrocarbon						
- TPH (C ₈ - 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 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 3rd ED. 2017 (AWWA APHA WEF)

Sudaporn Soonthorn

(Miss Sudaporn Soonthorn)

Analyst

REG. NO. 7-239-ก-0001

Araya Tipparuk

(Mrs. Araya Tipparuk)

Technical Management Team

REG. NO. 7-239-ก-5863

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GROUND WATER ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No	: 0486/66
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Pneumatic Bladder Pump
SAMPLING DATE	: 21, 24/03/2023	SAMPLING TIME	: 09:27-09:35, 10:28-10:34
RECEIVED DATE	: 25/03/2023	ANALYTICAL DATE	: 27-28/03/2023
REPORT DATE	: 01/04/2023	SITE OPERATOR	: Mr. Aniwat Pimwhanna
SAMPLE CONDITION	: Normal	FILE CODE	: 223003_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	0.45	≤ 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 21st ED. 2017 (AWWA APHA WEF)

(Miss Krisana Chanthoom)

Analyst

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(Mrs. Araya Tipparuk)

Technical Management Team

REG. NO. 7-239-ก-5863

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GROUND WATER ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No	: 0486/66
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Pneumatic Bladder Pump
SAMPLING DATE	: 21, 24/03/2023	SAMPLING TIME	: 09:27-09:35, 10:28-10:34
RECEIVED DATE	: 25/03/2023	ANALYTICAL DATE	: 29-30/03/2023
REPORT DATE	: 01/04/2023	SITE OPERATOR	: Mr. Aniwat Pimwhanna
SAMPLE CONDITION	: Normal	FILE CODE	: 223003_GW_March

PARAMETER	UNIT	ANALYSIS METHODS	ND (non-detectable)	STATION		STANDARD ^U
				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 21st ED. 2017 (AWWA APHA WEF)

(Miss Jutarat Jaemruen)

Analyst

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Technical Management Team

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GROUND WATER ANALYSIS REPORT

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SAMPLING DATE	: 21, 24/03/2023	SAMPLING TIME	: 09:27-09:35, 10:28-10:34
RECEIVED DATE	: 25/03/2023	ANALYTICAL DATE	: 29-30/03/2023
REPORT DATE	: 01/04/2023	SITE OPERATOR	: Mr. Aniwat Pimwhanna
SAMPLE CONDITION	: Normal	FILE CODE	: 223003_GW_March

PARAMETER	UNIT	ANALYSIS	ND	STATION		STANDARD ^{1/}
		METHODS	(non-detectable)	MW-114A	MW-115A	
Total Petroleum Hydrocarbon						
- TPH (C ₅ - C ₉)	mg/l	5030 C/8260 D	< 0.003	ND	ND	≤ 1.4
- Pentane						
- Benzene						
- Toluene						
- m,p-Xylene						
- o-Xylene						
- Ethylbenzene						
- TPH (C ₁₀ - 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-Tetracontane						
- Pentatriacontane						

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

Sudaporn Soonthorn

(Miss Sudaporn Soonthorn)

Analyst

REG. NO. 2-239-ท-0001

(Mrs. Araya Tipparuk)

Technical Management Team

REG. NO. 2-239-ท-5863

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SOIL SAMPLES ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No.	: 0662/64
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Hand Auger
SAMPLING DATE	: 22/24/03/2021	SAMPLING TIME	: 10.20-10.40 , 09.30-09.50
RECEIVED DATE	: 27/03/2021	ANALYTICAL DATE	: 02/04/2021
REPORT DATE	: 08/04/2021	SITE OPERATOR	: Mr. Baworn Deechaiya
SAMPLE CONDITION	: Normal	FILE CODE	: 221003_Soil_March

PARAMETER	UNIT	ANALYSIS METHODS	ND (non-detectable)	STATION		STANDARD ^{1/}
				MW-101 B	MW-102 A	
Naphthalene	mg/kg	3540 C / 8270 D	< 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

Natsiri L.

(Miss Natsiri Lertterapipal)

Analyst

REG. NO. 1-239-9-6423

(Mrs. Araya Tipparuk)

Technical Management Team

REG. NO. 1-239-9-5863

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SOIL SAMPLES ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No.	: 0662/64
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Hand Auger
SAMPLING DATE	: 22/24/03/2021	SAMPLING TIME	: 10.20-10.40 , 09.30-09.50
RECEIVED DATE	: 27/03/2021	ANALYTICAL DATE	: 30/03/2021-02/04/2021
REPORT DATE	: 08/04/2021	SITE OPERATOR	: Mr. Baworn Deechaiya
SAMPLE CONDITION	: Normal	FILE CODE	: 221003_Soil_March

PARAMETER	UNIT	ANALYSIS METHODS	ND (non-detectable)	STATION		STANDARD
				MW-101 B	MW-102 A	
Total Petroleum Hydrocarbons						
- 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 ₈ - 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 ₃₃)	mg/kg	3540C/8015 D	< 1.85	ND	ND	≤ 8
- n-Octadecane						
- n-Eicosane						
- n-Doocosane						
- n-Tetracosane						
- n-Hexacosane						
- n-Octacosane						
- n-Triacontane						
- n-Dotriacontane						
- n-Tetraatriacontane						
- Pentaatriacontane						

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

Kesvarin Sinsueg

(Miss Kesvarin Sinsueg)

Analyst

REG. NO. 1-239-9-6424

(Mrs. Araya Tipparuk)

Technical Management Team

REG. NO. 1-239-9-5863

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SOIL SAMPLES ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No.	: 0662/64
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Hand Auger
SAMPLING DATE	: 22-23/03/2021	SAMPLING TIME	: 10.50-11.10 ,09.40-09.53
RECEIVED DATE	: 27/03/2021	ANALYTICAL DATE	: 02/04/2021
REPORT DATE	: 08/04/2021	SITE OPERATOR	: Mr. Baworn Deechaiya
SAMPLE CONDITION	: Normal	FILE CODE	: 221003_Soil_March

PARAMETER	UNIT	ANALYSIS METHODS	ND (non-detectable)	STATION		STANDARD ¹⁾
				MW-103 A	MW-104 A	
Naphthalene	mg/kg	3540 C / 8270 D	< 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., 2021

Natsiri L.

(Miss Natsiri Leritapipat)

Analyst

REG. NO. 7-239-9-6423

(Mrs. Araya Tipparuk)

Technical Management Team

REG. NO. 7-239-9-5863

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SOIL SAMPLES ANALYSIS REPORT

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SAMPLING DATE	: 22-23/03/2021	SAMPLING TIME	: 10.50-11.10 ,09.40-09.53
RECEIVED DATE	: 27/03/2021	ANALYTICAL DATE	: 30/03/2021-02/04/2021
REPORT DATE	: 08/04/2021	SITE OPERATOR	: Mr. Baworn Deechaiya
SAMPLE CONDITION	: Normal	FILE CODE	: 221003_Soil_March

PARAMETER	UNIT	ANALYSIS	ND	STATION		STANDARD ¹⁾
		METHODS	(non-detectable)	MW-103 A	MW-104 A	
Total Petroleum Hydrocarbons						
- TPH (C ₈ - C ₁₆)	mg/kg	5035A / 8260 D	< 0.003	ND	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 ₈ - C ₁₆)	mg/kg	3540C/8015 D	< 0.25	ND	ND	≤ 25
- n-Nonane	mg/kg					
- n-Decane	mg/kg					
- n-Dodecane	mg/kg					
- n-Tetradecane	mg/kg					
- n-Hexadecane	mg/kg					
- TPH (C ₈ - C ₂₂)	mg/kg	3540C/8015 D	< 1.85	ND	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-Tetracontane	mg/kg					
- n-Pentatriacontane	mg/kg					

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

Kesvarin Sinsueg
(Miss Kesvarin Sinsueg)

Analyst

REG. NO. 7-239-9-6424

(Mrs. Araya Tipparuk)

Technical Management Team

REG. NO. 7-239-9-5863

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SOIL SAMPLES ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No.	: 0662/64
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Hand Auger
SAMPLING DATE	: 23/03/2021	SAMPLING TIME	: 10.15-10.30, 11.00-11.15
RECEIVED DATE	: 27/03/2021	ANALYTICAL DATE	: 02/04/2021
REPORT DATE	: 08/04/2021	SITE OPERATOR	: Mr. Baworn Deechaiya
SAMPLE CONDITION	: Normal	FILE CODE	: 221003_Soil_March

PARAMETER	UNIT	ANALYSIS METHODS	ND (non-detectable)	STATION		STANDARD ¹⁾
				MW-105 B	MW-106 B	
Naphthalene	mg/kg	3540 C / 8270 D	< 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., 2000

Natsiri L.

(Miss Natsiri Lerttirapipat)

Analyst

REG. NO. 7-239-9-6423

(Mrs. Araya Tipparuk)

Technical Management Team

REG. NO. 7-239-9-5863

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3. ¹⁾ Notification of the Ministry of Industry, B.E.2559 (2016).
4. - Not available.



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SOIL SAMPLES ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No.	: 0662/64
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Hand Auger
SAMPLING DATE	: 23/03/2021	SAMPLING TIME	: 10.15-10.30, 11.00-11.15
RECEIVED DATE	: 27/03/2021	ANALYTICAL DATE	: 30/03/2021-02/04/2021
REPORT DATE	: 08/04/2021	SITE OPERATOR	: Mr. Baworn Deechaiya
SAMPLE CONDITION	: Normal	FILE CODE	: 221003_Soil_March

PARAMETER	UNIT	ANALYSIS METHODS	ND. (non-detectable)	STATION		STANDARD
				MW-105 B	MW-106 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 ₇₋₈ - C ₁₀)	mg/kg	3540C/8015 D	< 0.25	ND	ND	≤ 25
- n-Nonane						
- n-Decane						
- n-Dodecane						
- n-Tetradecane						
- n-Hexadecane						
- TPH (C ₇₋₁₆ - C ₃₂)	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-Tetra triacontane						
- Pentatriacontane						

REFERENCE : US EPA SW 846 TEST METHODS FOR EVALUATING WATER AND SOLID WASTE 1st ED., 2000

Kesvarin Sinsueg
(Miss Kesvarin Sinsueg)

Analyst

REG. NO. 7-239-9-6424

(Mrs. Araya Tipparuk)

Technical Management Team

REG. NO. 7-239-9-5863

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4. - Not available.



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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.	: 0662/64
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Hand Auger
SAMPLING DATE	: 23/26/03/2021	SAMPLING TIME	: 14.15-14.30, 09.30-09.50
RECEIVED DATE	: 27/03/2021	ANALYTICAL DATE	: 02/04/2021
REPORT DATE	: 08/04/2021	SITE OPERATOR	: Mr. Baworn Deechaiya
SAMPLE CONDITION	: Normal	FILE CODE	: 221003_Soil_March

PARAMETER	UNIT	ANALYSIS METHODS	ND (non-detectable)	STATION		STANDARD ^u
				MW-108 B	MW-109 A	
Naphthalene	mg/kg	3540 C / 8270 D	< 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	0.00556	≤ 210
p-Xylene	mg/kg	5035 A / 8260 D	< 0.00025	ND	0.05908	≤ 210
Total Xylenes	mg/kg	5035 A / 8260 D	< 0.00075	ND	0.06464	≤ 210

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

Natsiri L.

(Miss Natsiri Lertterapipai)

Analyst

REG. NO. 7-239-n-6423

(Mrs. Araya Tipparak)

Technical Management Team

REG. NO. 7-239-n-5863

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SOIL SAMPLES ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No.	: 0662/64
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Hand Auger
SAMPLING DATE	: 23/26/03/2021	SAMPLING TIME	: 14.15-14.30, 09.30-09.50
RECEIVED DATE	: 27/03/2021	ANALYTICAL DATE	: 30/03/2021-02/04/2021
REPORT DATE	: 08/04/2021	SITE OPERATOR	: Mr. Baworn Deechaiya
SAMPLE CONDITION	: Normal	FILE CODE	: 221003_Soil_March

PARAMETER	UNIT	ANALYSIS	ND	STATION		STANDARD ^{1/}
		METHODS	(non-detectable)	MW-108 B	MW-109 A	
Total Petroleum Hydrocarbons						
- TPH (C ₇ - C ₉)	mg/kg	5035A /8260 D	< 0.003	ND	0.14	≤ 25
- Pentane						
- Benzene						
- Toluene						
- m,p-Xylene						
- o-Xylene						
- Ethylbenzene						
- TPH (C ₁₁ - 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	ND	≤ 8
- n-Octadecane						
- n-Eicosane						
- n-Docosane						
- n-Tetracosane						
- n-Hexacosane						
- n-Octacosane						
- n-Triacontane						
- n-Dotriacontane						
- n-Tetracontane						
- n-Pentatriacontane						

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

Kesvarin Sinsueg

(Miss Kesvarin Sinsueg)

Analyst

REG. NO. 7-239-n-6424

(Mrs. Araya Tipparak)

Technical Management Team

REG. NO. 7-239-n-5863

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SOIL SAMPLES ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No.	: 0662/64
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Hand Auger
SAMPLING DATE	: 24-25/03/2021	SAMPLING TIME	: 08.35-08.55 ,09.20-09.40
RECEIVED DATE	: 27/03/2021	ANALYTICAL DATE	: 02/04/2021
REPORT DATE	: 08/04/2021	SITE OPERATOR	: Mr. Baworn Deechaiya
SAMPLE CONDITION	: Normal	FILE CODE	: 221003_Soil_March

PARAMETER	UNIT	ANALYSIS METHODS	ND (non-detectable)	STATION		STANDARD ^{1/}
				MW-112 A	MW-113 A	
Naphtalene	mg/kg	3540 C / 8270 D	< 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 : USEPA SW 846 TEST METHODS FOR EVALUATING WATER AND SOLID WASTE, 3rd ED., 2020

Natsiri L.

(Miss Natsiri Lertterapipat)

Analyst

REG. NO. 7-239-9-6423

(Mrs. Araya Tipparuk)

Technical Management Team

REG. NO. 7-239-9-5863

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SOIL SAMPLES ANALYSIS REPORT

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REQUEST SERVICE No.	: 0662/64
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Hand Auger
SAMPLING DATE	: 24-25/03/2021	SAMPLING TIME	: 08.35-08.55 ,09.20-09.40
RECEIVED DATE	: 27/03/2021	ANALYTICAL DATE	: 30/03/2021-02/04/2021
REPORT DATE	: 08/04/2021	SITE OPERATOR	: Mr. Baworn Deechaiya
SAMPLE CONDITION	: Normal	FILE CODE	: 221003_Soil_March

PARAMETER	UNIT	ANALYSIS METHODS	ND (non-detectable)	STATION		STANDARD ¹
				MW-112 A	MW-113 A	
Total Petroleum Hydrocarbons						
- TPH (C ₉ - C ₁₀)	mg/kg	5035A / 8260 D	< 0.003	ND	ND	≤ 25
- Pentane						
- Benzene						
- Toluene						
- m,p-Xylene						
- o-Xylene						
- Ethylbenzene						
- TPH (C ₉₋₈ - C ₁₆)	mg/kg	3540C/8015 D	< 0.25	ND	ND	≤ 25
- n-Nonane						
- n-Decane						
- n-Dodecane						
- n-Tetradecane						
- n-Hexadecane						
- TPH (C ₉₋₁₆ - 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 : USEPA SW 846 TEST METHODS FOR EVALUATING WATER AND SOLID WASTE, 3rd ED., 2020

Kesvarin Sinsueg

(Miss Kesvarin Sinsueg)

Analyst

REG. NO. 7-239-9-6424

(Mrs. Araya Tipparuk)

Technical Management Team

REG. NO. 7-239-9-5863

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 4. - Not available.

ใบรับรองผลการตรวจวัดระดับเสียงภายในสถานประกอบการ



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

Location : CDU (Near 02GM102A)		Monitor Period : Feb 23, 2023	
SLM Model : CASELLA CEL-246		Serial No : 1443838	
Site Operator : Mr. Aniwat Pimwanna			
Calibrator Model : CASELLA CEL120/2		Serial No : 2839225	
Calibration Ref dB(A) : 114.0		Certified Date : Jan 13, 2023	
SLM Reading / Adjust dB(A) : 113.8/0.2		Expire Date : Jan 12, 2024	
Cal Sheet No.: CEL120/2-2023-015			
Time	Equivalent Sound Pressure Level (dB(A))		
	Feb 23, 2023		
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			
09:00 – 10:00			
10:00 – 11:00			
11:00 – 12:00			
12:00 – 13:00			
13:00 – 14:00			
14:00 – 15:00			
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 **	86.6		
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

Ladawan N.

(Miss Ladawan Wongcharoen)
Environmental Scientist

Suk Sunthanan

(Miss Sununta Sirawuttinanon)
Technical Management Team

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

Location : NHTU (Near 08G102A-B)		Monitor Period : Feb 23, 2023		
SLM Model : CASELLA CEL-246		Serial No : 3173135		
Site Operator : Mr. Aniwat Pimwanna				
Calibrator Model : CASELLA CEL120/2		Serial No : 2839225		
Calibration Ref dB(A) : 114.0		Certified Date : Jan 13, 2023		
SLM Reading / Adjust dB(A) : 113.7/0.3		Expire Date : Jan 12, 2024		
Cal Sheet No.: CEL120/2-2023-015				
Time	Equivalent Sound Pressure Level (dB(A))			
	Feb 23, 2023			
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				85.5
09:00 - 10:00				85.0
10:00 - 11:00				84.8
11:00 - 12:00				84.6
12:00 - 13:00				84.4
13:00 - 14:00				84.7
14:00 - 15:00				84.9
15:00 - 16:00				84.9
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)*	84.9			
Lmax **	91.0			
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

Ladawan N.

(Miss Ladawan Wongcharoen)
Environmental Scientist

Suk Sunthanan

(Miss Sununta Sirawuttinanon)
Technical Management Team



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239 Rimklongprapa Rd.
Bangsue, Bangkok 10800
Tel: +66(0)2959-3600 Fax: +66(0)2959-3535



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

Location : CDU (Near 02GM102A) Monitor Period : May 05, 2023
SLM Model : SCARLET ST-21D Serial No : 820724
Site Operator : Mr. Watcharakon Pramakhate

Calibrator Model : Cirrus CR:515 Serial No : 94296
Calibration Ref dB(A) : 94.0 Certified Date : Sep 12, 2022
SLM Reading / Adjust dB(A) : 93.7/0.2 Expire Date : Sep 11, 2023
Cal Sheet No.: CR-515-2023-050

Time	Equivalent Sound Pressure Level (dB(A))	
	May 05, 2023	
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	83.6	
09:00 - 10:00	83.5	
10:00 - 11:00	84.7	
11:00 - 12:00	84.9	
12:00 - 13:00	85.0	
13:00 - 14:00	85.0	
14:00 - 15:00	85.0	
15:00 - 16:00	84.9	
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)*	84.6	
Lmax **	88.3	
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 : NHTU (Near 08G102A-B) Monitor Period : May 05, 2023
SLM Model : SCARLET ST-21D Serial No : 820722
Site Operator : Mr. Watcharakon Pramakhate

Calibrator Model : Cirrus CR:515 Serial No : 94296
Calibration Ref dB(A) : 94.0 Certified Date : Sep 12, 2022
SLM Reading / Adjust dB(A) : 93.7/0.0 Expire Date : Sep 11, 2023
Cal Sheet No.: CR-515-2023-050

Time	Equivalent Sound Pressure Level (dB(A))	
	May 05, 2023	
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	85.4	
09:00 - 10:00	85.4	
10:00 - 11:00	85.4	
11:00 - 12:00	85.3	
12:00 - 13:00	85.4	
13:00 - 14:00	85.0	
14:00 - 15:00	84.8	
15:00 - 16:00	84.7	
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 **	97.5	
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 (during 41G103A-B)		Monitor Period : May 05, 2023	
SLM Model : SCARLET ST-21D		Serial No : 820731	
Site Operator : Mr. Watcharakan Pramakhate			
Calibrator Model : Cirrus CR:515		Serial No : 94296	
Calibration Ref dB(A) : 94.0		Certified Date : Sep 12, 2022	
SLM Reading / Adjust dB(A) : 93.7/0.0		Expire Date : Sep 11, 2023	
Cal Sheet No.: CR-515-2023-050			
Time	Equivalent Sound Pressure Level (dB(A))		
	May 05, 2023		
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			
09:00 – 10:00			
10:00 – 11:00			
11:00 – 12:00			
12:00 – 13:00			
13:00 – 14:00			
14:00 – 15:00			
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)*	88.7		
Lmax **	89.8		
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 : RFCCU (Near 17GM102 A-B)		Monitor Period : May 05, 2023	
SLM Model : SCARLET ST-21D		Serial No : 820726	
Site Operator : Mr. Watcharakan Pramakhate			
Calibrator Model : Cirrus CR:515		Serial No : 94296	
Calibration Ref dB(A) : 94.0		Certified Date : Sep 12, 2022	
SLM Reading / Adjust dB(A) : 93.7/0.1		Expire Date : Sep 11, 2023	
Cal Sheet No.: CR-515-2023-050			
Time	Equivalent Sound Pressure Level (dB(A))		
	May 05, 2023		
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	87.9		
09:00 - 10:00	87.6		
10:00 - 11:00	87.5		
11:00 - 12:00	87.0		
12:00 - 13:00	87.0		
13:00 - 14:00	87.5		
14:00 - 15:00	87.4		
15:00 - 16:00	87.4		
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)*	87.4		
Lmax **	96.9		
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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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 IH-223005_Ns Dose (Cert)
MEASUREMENT BY	: SECOT Co., Ltd.	INSTRUMENT	: Noise Dosimeter
MEASUREMENT DATE	: 23/02/2023	CALIBRATOR TYPE	: Cirrus RC 110A
MEASUREMENT LOCATION	: Process area	SERIAL NO.	: 95168
SITE OPERATOR	: Mr. Aniwat Pimwanna	CALIBRATOR REF.	: 1,000 Hz, 114 dB

USER NAME	AREA/PLANT	TIME	%DOSE	SOUND PRESSURE LEVEL (dBA)	
				TWA (12-hr)	STANDARD*
Operator ID#110786	Area 1	07.14-19.00	87.0	82.6	83.0
	(CDU/VDU)				
Operator ID#110233	Area 2	07.15-19.00	51.7	80.4	83.0
	(NHTU, DHTU, WCN, BSU)				

Ladawan W.

(Miss Ladawan Wongcharoen)

Environmental Scientist

Sununta S.

(Miss Sununta Sirawuttinanon)

Technical Management Team

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 4. TWA means Time Weighted Average.



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NOISE MEASUREMENT REPORT : NOISE DOSE

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REFERENCE NO.	: SPRC IH-223005_Ns Dose (Cert)
MEASUREMENT BY	: SECOT Co., Ltd.	INSTRUMENT	: Noise Dosimeter
MEASUREMENT DATE	: 23/02/2023	CALIBRATOR TYPE	: Pulsar 22R
MEASUREMENT LOCATION	: Process area	SERIAL NO.	: 79781
SITE OPERATOR	: Mr. Aniwat Pimwanna	CALIBRATOR REF.	: 1,000 Hz, 114 dB

USER NAME	AREA/PLANT	TIME	%DOSE	SOUND PRESSURE LEVEL (dBA)	
				TWA (12-hr)	STANDARD*
Operator ID#110491	Area 3	07.15-19.00	73.7	81.9	83.0
	(SRU, Utility)				

Ladawan W.

(Miss Ladawan Wongcharoen)

Environmental Scientist

Sununta S.

(Miss Sununta Sirawuttinanon)

Technical Management Team

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NOISE MEASUREMENT REPORT : NOISE DOSE

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REFERENCE NO.	: SPRC IH-223005_Ns Dose (Cert)
MEASUREMENT BY	: SECOT Co., Ltd.	INSTRUMENT	: Noise Dosimeter
MEASUREMENT DATE	: 28/03/2023	CALIBRATOR TYPE	: Pulsar 22R
MEASUREMENT LOCATION	: Process area	SERIAL NO.	: 79781
SITE OPERATOR	: Mr. Chanapon Oakkharaplon	CALIBRATOR REF.	: 1,000 Hz, 114 dB

USER NAME	AREA/PLANT	TIME	%DOSE	SOUND PRESSURE LEVEL (dBA)	
				TWA (12-hr)	STANDARD*
Operator ID#110767	Area 4	07.15-19.00	138.6	84.7	83.0
	(RFCCU)				

Ladawan H.

(Miss Ladawan Wongcharoen)

Environmental Scientist

Sun Suthananon

(Miss Sununta Sirawuttinanon)

Technical Management Team

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NOISE MEASUREMENT REPORT : NOISE DOSE

CLIENT NAME	: Star Petroleum Refining Public Co., Ltd.	REFERENCE NO.	: SPRC IH-223005_Ns Dose (Cert)
MEASUREMENT BY	: SECOT Co., Ltd.	INSTRUMENT	: Noise Dosimeter
MEASUREMENT DATE	: 05/05/2023	CALIBRATOR TYPE	: Cirrus RC 110A
MEASUREMENT LOCATION	: Process area	SERIAL NO.	: 95168
SITE OPERATOR	: Mr. Watcharakan P.	CALIBRATOR REF.	: 1,000 Hz, 114 dB

USER NAME	AREA/PLANT	TIME	%DOSE	SOUND PRESSURE LEVEL (dBA)	
				TWA (12-hr)	STANDARD*
Operator ID#110855	Area 2	07.11-19.00	26.9	77.6	83.0
	(NHTU, DHTU, WCN, BSU)				
Operator ID#110155	Area 3	07.06-19.00	91.2	82.8	83.0
	(SRU, Utility)				

Katesarin Vorradetwittaya

(Miss Katesarin Vorradetwittaya)

Environmental Scientist

Sun Suthananon

(Miss Sununta Sirawuttinanon)

Technical Management Team

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NOISE MEASUREMENT REPORT : NOISE DOSE

CLIENT NAME : Star Petroleum Refining Public Co., Ltd. REFERENCE NO. : SPRC IH-223005_Ns Dose (Cert)
MEASUREMENT BY : SECOT Co., Ltd. INSTRUMENT : Noise Dosimeter
MEASUREMENT DATE : 20/06/2023 CALIBRATOR TYPE : Pulsar 22R
MEASUREMENT LOCATION : Process area SERIAL NO. : 79781
SITE OPERATOR : Mr. Watcharakan P. CALIBRATOR REF. : 1,000 Hz, 114 dB

USER NAME	AREA/PLANT	TIME	%DOSE	SOUND PRESSURE LEVEL (dBA)	
				TWA (12-hr)	STANDARD*
Operator ID#110840	Area 1	07.00-19.00	126.5	84.3	83.0
	(CDU/VDU)				

(Miss Katesarin Vorradetwittaya)

Environmental Scientist

(Miss Sununta Sirawuttinanon)

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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 IH-223005_Ns Dose (Cert)
MEASUREMENT BY : SECOT Co., Ltd. INSTRUMENT : Noise Dosimeter
MEASUREMENT DATE : 20/06/2023 CALIBRATOR TYPE : Cirrus RC 110A
MEASUREMENT LOCATION : Process area SERIAL NO. : 95168
SITE OPERATOR : Mr. Watcharakan P. CALIBRATOR REF. : 1,000 Hz, 114 dB

USER NAME	AREA/PLANT	TIME	%DOSE	SOUND PRESSURE LEVEL (dBA)	
				TWA (12-hr)	STANDARD*
Operator ID#110781	Area 4	07.00-19.00	153.4	85.1	83.0
	(RFCCU)				

(Miss Katesarin Vorradetwittaya)

Environmental Scientist

(Miss Sununta Sirawuttinanon)

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ภาคผนวก จ

ข้อมูลการตรวจเทียบเครื่องมือ
(Calibration Data Sheets)



High Volume TSP & PM-10 Calibration Data Sheet

Calibration Location : SECOT Co.,Ltd. Calibration Date : Jan 9, 2023
 Hi-Vol Pump No. : BH-004 Indicator No. : CM-01
 Amb. Temp (°C) : 26 Press (mmHg) : 760
 Calibration by : Mr.Punkawin K.

Plate	Indicate (X) (cm.)	True H ₂ O (in.)	Actual Flow (Y) (cfm)	XY	X ²	Remark
18	19.40	12.80	59.53	1,154.88	376.36	
13	15.20	10.00	52.94	804.69	231.04	
10	12.20	7.80	46.90	572.18	148.84	
7	7.80	4.90	37.44	292.03	60.84	
5	4.80	3.00	29.58	141.98	23.04	
Sum	59.40	38.50	226.39	2,965.77	840.12	

Calibrated by : Punkawin K. Approved by : Wittaya K.



High Volume TSP & PM-10 Calibration Data Sheet

Calibration Location : SECOT Co.,Ltd. Calibration Date : Jan 12, 2023
 Hi-Vol Pump No. : BH-015 Indicator No. : CM-01
 Amb. Temp (°C) : 27 Press (mmHg) : 760
 Calibration by : Mr.Nattachai C.

Plate	Indicate (X) (cm.)	True H ₂ O (in.)	Actual Flow (Y) (cfm)	XY	X ²	Remark
18	19.00	12.50	58.84	1,117.96	361.00	
13	15.80	9.90	52.68	832.34	249.64	
10	12.60	7.70	46.61	587.29	158.76	
7	8.60	4.90	37.44	321.98	73.96	
5	5.40	2.90	29.10	157.14	29.16	
Sum	61.40	37.90	224.67	3,016.71	872.52	

Calibrated by : Nattachai C. Approved by : Wittaya K.



High Volume TSP & PM-10 Calibration Data Sheet

Calibration Location : SECOT Co.,Ltd. Calibration Date : Jan 12, 2023
 Hi-Vol Pump No. : BH-021 Indicator No. : CM-01
 Amb. Temp (°C) : 27 Press (mmHg) : 760
 Calibration by : Mr.Nattachai C.

Plate	Indicate (X) (cm.)	True H ₂ O (in.)	Actual Flow (Y) (cfm)	XY	X ²	Remark
18	18.20	12.40	58.61	1,066.70	331.24	
13	14.60	9.90	52.68	769.13	213.16	
10	12.00	7.60	46.31	555.72	144.00	
7	8.20	5.00	37.81	310.04	67.24	
5	5.20	3.00	29.58	153.82	27.04	
Sum	58.20	37.90	224.99	2,855.41	782.68	

Calibrated by : Nattachai C. Approved by : Wattana K.



High Volume TSP & PM-10 Calibration Data Sheet

Calibration Location : SECOT Co.,Ltd. Calibration Date : Jan 12, 2023
 Hi-Vol Pump No. : BH-028 Indicator No. : CM-01
 Amb. Temp (°C) : 27 Press (mmHg) : 760
 Calibration by : Mr.Nattachai C.

Plate	Indicate (X) (cm.)	True H ₂ O (in.)	Actual Flow (Y) (cfm)	XY	X ²	Remark
18	19.60	12.20	58.15	1,139.74	384.16	
13	15.60	9.90	52.68	821.81	243.36	
10	12.20	7.50	46.02	561.44	148.84	
7	8.20	5.00	37.81	310.04	67.24	
5	4.20	3.00	29.58	124.24	17.64	
Sum	59.80	37.60	224.24	2,957.27	861.24	

Calibrated by : Nattachai C. Approved by : Wattana K.



High Volume TSP & PM-10 Calibration Data Sheet

Calibration Location : SECOT Co.,Ltd. Calibration Date : Jan 9, 2023
 Hi-Vol Pump No. : BH-032 Indicator No. : CM-01
 Amb. Temp (°C) : 26 Press (mmHg) : 760
 Calibration by : Mr.Punkawin K.

Plate	Indicate (X) (cm.)	True H ₂ O (in.)	Actual Flow (Y) (cfm)	XY	X ²	Remark
18	19.80	12.80	59.53	1,178.69	392.04	
13	16.30	10.20	53.45	871.24	265.69	
10	12.60	8.00	47.48	598.25	158.76	
7	8.60	5.20	38.53	331.36	73.96	
5	5.20	3.20	30.50	158.60	27.04	
Sum	62.50	39.40	229.49	3,138.14	917.49	

Calibrated by : Punkawin Approved by : Wittaya K.



High Volume TSP & PM-10 Calibration Data Sheet

Calibration Location : SECOT Co.,Ltd. Calibration Date : Jan 12, 2023
 Hi-Vol Pump No. : BH-035 Indicator No. : CM-01
 Amb. Temp (°C) : 27 Press (mmHg) : 760
 Calibration by : Mr.Nattachai C.

Plate	Indicate (X) (cm.)	True H ₂ O (in.)	Actual Flow (Y) (cfm)	XY	X ²	Remark
18	20.40	14.00	62.20	1,268.88	416.16	
13	16.20	10.10	53.20	861.84	262.44	
10	13.20	8.10	47.77	630.56	174.24	
7	8.20	5.30	38.89	318.90	67.24	
5	5.40	3.10	30.44	164.38	29.16	
Sum	63.40	40.60	232.50	3,244.56	949.24	

Calibrated by : Nattachai C. Approved by : Wittaya K.

Sheet No. : CAL-M5006/01/23



CONTROL UNIT CALIBRATION

(Metric units, mm)

Date 16 Jan 23

Initial Final Average
Barometric press, Pb 759 759 759 mmHg

Dry Gas Meter Data

Console No. M50-06

Metering System ID

DGM Number 333249

DGM Model MST-C2-1

Calibrated by : Montri P.

Reference Dry Gas Meter Data

Serial No. 358794

Model S110

Correction factor (Yr) 1.0079

Last Calibration Date 9 Dec 22

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	100.1	100.9	25	25	24	24.5	8.60	0.9968	41.8649
25.0	100.0	100.4	25	25	24	24.5	6.13	0.9998	42.6722
50.0	100.1	100.6	25	25	24	24.5	4.53	0.9963	46.5503
76.0	99.9	100.4	25	25	24	24.5	3.75	0.9949	48.5425
100.0	100.0	99.3	25	25	24	24.5	3.75	1.0031	45.5096
150.0	100.2	98.7	25	25	24	24.5	2.58	1.0070	45.2316
Average								0.9997	45.0618

Approved by : Ladawan W.

Sheet No. : CAL-M5008/01/23



CONTROL UNIT CALIBRATION

(Metric units, mm)

Date 10 Jan 23

Initial Final Average
Barometric press, Pb 757 757 757 mmHg

Dry Gas Meter Data

Console No. M50-08

Metering System ID

DGM Number 971415

DGM Model ES-110

Calibrated by : Montri P.

Reference Dry Gas Meter Data

Serial No. 358794

Model S110

Correction factor (Yr) 1.0079

Last Calibration Date 9 Dec 22

Orifice manometer setting, ΔH mm H2O	Ref. DGM Volume V _r Liters	DGM Volume V _m Liters	Temperature (°C)				Time Θ 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	98.5	25	25	24	24.5	8.43	1.0203	40.4451
25.0	100.0	100.1	25	25	24	24.5	6.08	1.0028	42.0902
50.0	100.0	99.2	25	25	24	24.5	4.33	1.0095	42.7141
76.0	100.2	98.7	25	25	24	24.5	3.57	1.0141	43.8087
100.0	100.0	98.7	25	25	24	24.5	3.57	1.0097	44.6653
150.0	100.1	96.8	25	25	24	24.5	2.57	1.0256	44.8662
Average								1.0137	43.0983

Approved by : Ladawan W.



PITOT TUBE CALIBRATION

Calibration Location: SECOT

Calibration Date : 06-01-2023

Calibrated duct No.: 1

Calibration Standard Pitot tube data

Pitot No. : Std-01

Coefficient (Cp) : 1

Type S Pitot No. : PS20-02

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	7.50	10.75	0.8353	0.0032
2	7.50	11.00	0.8257	-0.0064
3	7.50	10.75	0.8353	0.0032

 $C_{P(A),avg}$ 0.8321

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	7.50	10.75	0.8353	-0.0033
2	7.50	10.50	0.8452	0.0066
3	7.50	10.75	0.8353	-0.0033

 $C_{P(B),avg}$ 0.8386 $|CP(A) - CP(B)| = 0.0065$ $C_{P(Avg)} = 0.8353$

Approved by : Ladawan W.

*** 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 ***



PITOT TUBE CALIBRATION

Calibration Location: SECOT

Calibration Date : 06-01-2023

Calibrated duct No.: 1

Calibration Standard Pitot tube data

Pitot No. : Std-01

Coefficient (Cp) : 1

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	7.50	10.75	0.8353	-0.0033
2	7.50	10.50	0.8452	0.0066
3	7.50	10.75	0.8353	-0.0033

 $C_{P(A),avg}$ 0.8386

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	7.50	10.50	0.8452	0.0033
2	7.50	10.75	0.8353	-0.0066
3	7.50	10.50	0.8452	0.0033

 $C_{P(B),avg}$ 0.8419 $|CP(A) - CP(B)| = 0.0033$ $C_{P(Avg)} = 0.8402$

Approved by : Ladawan W.

*** 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 ***

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	50.67 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	13080205	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	4.871 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 J3-599 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

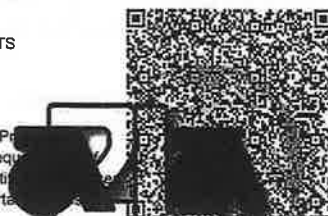
PERMANENT NOTES: PRODUCED IN ACCORDANCE WITH ISO17025 REQUIREMENTS

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 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. This document shall not be reproduced in full without written approval of the issuer.



ACCREDITED

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		Address:		Customer Tag No.:
Name:	Secot Co., Ltd.	House No.239, Rimklongprapa Rd, Bang Sue, Bangkok10800		
Certificate Details		Date of Issue:		Expired date:
Number:	0334/19	5-Feb-2019		5-Feb-2027
Material Details		Material Code:		Cylinder No.:
Production Order:	90152421	533100-AL-44		D339457
Gas content:	6.900 M ³	Filling pressure:	145.0 Bar	Valve:
Cylinder Owner:	LINDE	Cylinder Material:	Aluminum	CGA 350 BRASS
Laboratory Report		Cylinder Size:		50 L

Component		Normal Concentration	Analytical Result		Uncertainty ²	Method of Analysis ³	Assay Date
Carbon Monoxide		80.0 ppm	80.3 ppm		± 1% relative	(6) I-PB-352	4-Feb-2019
Nitrogen		Balance					

Reference Standard		Reference Standard used in Assay		Expired date
Carbon Monoxide in Nitrogen		Cylinder number	Concentration	
		258001SG	99.5 ± 0.8 ppm	20-Aug-2020

Instrument/Make/Model
FTIR Spectrometers Nicolet i550

Analytical Instruments used in Assay
Analytical Principle
FTIR-CO

Last Multipoint Calibration
4-Feb-2019

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 Parinyasontorn

Signatory for and on behalf of Linde (Thailand) Co., Ltd.

Page 1 of 1

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PB-002/F006

Iss: H/2, 01 March 2018

บริษัท ลินด์ (ประเทศไทย) จำกัด (มหาชน)

เลขที่ใบอนุญาต: 01/0753700785

ชั้น 15 อาคารทาวเวอร์ A, 2/3 Moo 14, Bangna Trud Rd. 6.5 Road, Bangnae

อ.บางพลี จ.สมุทรปราการ 10540 โทรศัพท์ (66) 2338-6100 โทรสาร (66) 2338-6333

โรงงานผลิต: 105 Moo 5, T.Bangnamak, A.Bangpakong, Chachoengsao 24180

โทรศัพท์ (66) 38.570-479-93

โทรสาร (66) 38.570-323

Linde (Thailand) Public Company Limited

PLC Registration no. 01/0753700785

15th Floor, Bangna Tower A, 2/3 Moo 14, Bangna Trud Rd. 6.5 Road, Bangnae

Bangplee, Samutprakarn 10540, Tel (66) 2338-6100 Fax (66) 2338-6333

Wellgrow Plant: 105 Moo 5, T.Bangnamak, 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: 2135/20 Date of Issue: 19-May-2020 Expiry date: 18-May-2028
 Material Details
 Production Order: 90160199 Material Code: 477200-AL-44 Cylinder No.: D595120
 Gas content: 6.90 M³ Filling pressure: 145.0 bar Valve: CGA 660 SS
 Cylinder Owner: LINDE Cylinder Material: Aluminum Cylinder Size: 50 L

Laboratory Report

Analytical Result

Component	Nominal Concentration	Analysis Result ¹	Uncertainty ²	Method of Analysis ³	Assay Date
Sulphur Dioxide In Nitrogen	800 ppm	802 ppm	± 1% relative	(6) I-PB-352	12-May & 19-May-20

Reference Standard used in Assay

Reference Standard	Cylinder number	Concentration	Expiry date:
Sulphur Dioxide In Nitrogen	265838SG	514.9 ± 2.4 ppm	18-Dec-2020

Analytical Instruments used in Assay

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
FTIR Spectrometers Nicolet iS50	FTIR-SO2	11-May-2020

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

Page 1 of 1

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บริษัท ลินด์ (ประเทศไทย) จำกัด (มหาชน)

เลขที่ใบอนุญาต: ๒๕๖๒/๒๓/๑๔

ชั้น 15 อาคารทาวเวอร์ 10540 ถนนวิภาวดีรังสิต แขวงจตุจักร เขตจตุจักร กรุงเทพฯ 10540 โทร (66) 2338-6100 โทรสาร (66) 2338-6333

โรงงานผลิต: 105 Moo 5, T.Bangsamak, A.Bangpakong, Chachoengsao 24180

โทร (66) 38-570-479-93 โทรสาร (66) 38-570-323

Sukanya Parinyasoonorn

Signatory for and on behalf of Linde (Thailand) Co., Ltd.

Linde (Thailand) Public Company Limited

P.L.C. Registration No. B10733980385

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

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: 2972/20 Date of Issue: 18-Jul-2020 Expiry date: 18-Jul-2024
 Material Details
 Production Order: 90159708 Material Code: 608400-SK-44 Cylinder No.: 95078
 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	Nominal Concentration	Analysis Result ¹	Uncertainty ²	Method of Analysis ³	Assay Date
Sulphur Dioxide In Nitrogen	40.0 ppm	41.7 ppm	± 1% relative	(6) I-PB-352	11-Jul & 18-Jul-20

Reference Standard used in Assay

Reference Standard	Cylinder number	Concentration	Expiry date:
Sulphur Dioxide In Nitrogen	7662675G	51.18 ± 0.41 ppm	17-Apr-2021

Analytical Instruments used in Assay

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
FTIR Spectrometers Nicolet iS50	FTIR-SO2	16-Jun & 17-Jul-20

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

Page 1 of 1

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บริษัท ลินด์ (ประเทศไทย) จำกัด (มหาชน)

เลขที่ใบอนุญาต: ๒๕๖๒/๒๓/๑๔

ชั้น 15 อาคารทาวเวอร์ 10540 ถนนวิภาวดีรังสิต แขวงจตุจักร เขตจตุจักร กรุงเทพฯ 10540 โทร (66) 2338-6100 โทรสาร (66) 2338-6333

โรงงานผลิต: 105 Moo 5, T.Bangsamak, A.Bangpakong, Chachoengsao 24180

โทร (66) 38-570-479-93 โทรสาร (66) 38-570-323

Sukanya Parinyasoonorn

Signatory for and on behalf of Linde (Thailand) Co., Ltd.

Linde (Thailand) Public Company Limited

P.L.C. Registration No. B10733980385

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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

PB-002/F006

1/1, 01 October 2019

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: 2954/21 Date of Issue: 17-Jul-2021 Expiry date: 17-Jul-2023
Material Details
Production Order: 90166594 Material Code: 614500-SK-44 Cylinder No.: A00871SK
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
Nitric Oxide	80.0 ppm	78.8 ppm	± 1% relative	(6) I-PB-352	10-Jul & 17-Jul-21
Other NOx Impurity in Nitrogen		Less than 3.9 ppm			

Reference Standard used in Assay

Reference Standard Nitric Oxide in Nitrogen
Cylinder number 278811SG Concentration 51.58 ± 0.41 ppm Expiry date: 29-Oct-2022

Analytical Instruments used in Assay

Instrument/Make/Model FTIR Spectrometers Nicolet iSSO Analytical Principle FTIR-NO Last Multipoint Calibration 24-Jun-2021

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:

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.

PB-002/F006

Linde (Thailand) Public Company Limited Iss:K/1, 01 July 2021

P.L.C. Registration no. 0107537000725

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

Page 1 of 1

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บริษัท ลินด์ (ประเทศไทย) จำกัด (มหาชน)

เลขที่ใบอนุญาตประกอบธุรกิจ 0107537000725

ชั้น 15 อาคารทาวเวอร์ เอ 2/3 มอ 14 ถนนสายการค้าบางนา กม. 6.5 แขวงคลอง

บางพลี เขตอุตสาหกรรม 10540 กรุงเทพมหานคร (66) 2338-6100 โทรสาร (66) 2338-6333

โรงงานปลูกชำ: 105 มอ 5 ตำบลบางสมัก อ.บางปะกง จ.ฉะเชิงเทรา 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: 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 Sulphur Dioxide in Nitrogen
Cylinder number 145754SG Concentration 25.03 ± 0.25 ppm Expiry date: 18-Aug-2022

Analytical Instruments used in Assay

Instrument/Make/Model FTIR Spectrometers Nicolet iSSO Analytical Principle FTIR-SO2 Last Multipoint Calibration 27-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:

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.

PB-002/F006

Linde (Thailand) Public Company Limited Iss:K/2, 15 Oct 2021

P.L.C. Registration no. 0107537000725

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

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: 0273/22 Date of Issue: 4-Feb-2022 Expiry date: 4-Feb-2030
Material Details
Production Order: 90169723 Material Code: 445100-SK-44 Cylinder No.: D636047
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	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 i550	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:

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

Page 1 of 1

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บริษัท ลินด์ (ประเทศไทย) จำกัด (มหาชน)

เลขที่ใบอนุญาตประกอบกิจการ 0107537000005

ชั้น 15 อาคารทาวเวอร์ เอ 2/3 หมู่ 14 ถนนลาดพร้าว-ศรีนครินทร์ กม. 6.5 แขวงลาดพร้าว

แขวงคลองจั่น กรุงเทพมหานคร 10540 โทรศัพท์ (66) 2338-6100 โทรสาร (66) 2338-6333

โทรสารมือถือ: 105 หมู่ 5 แขวงคลองจั่น กรุงเทพมหานคร 10540

โทรศัพท์ (66) 38.570-479-93

โทรสาร (66) 38.570-323

Sukanya Parinyasoontorn

Signatory for and on behalf of Linde (Thailand) Co., Ltd.

Linde (Thailand) Public Company Limited

PLC Registration no. 0107537000005

15th Floor, Bangna Tower A, 2/3 Moo 14, Bangna Trad KM. 6.5 Road, Bangkaew

Bangplee, Samutprakarn 10540 โทรศัพท์ (66) 2338-6100 โทรสาร (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

PB-002/F006

Iss:K/2, 15 Oct 2021

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: 0328/22 Date of Issue: 9-Feb-2022 Expiry date: 9-Feb-2024
Material Details
Production Order: 90169718 Material Code: 511500-SK-34 Cylinder No.: D519506
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	20.0 ppm	19.6 ppm	± 1% relative	(6) I-PB-352	1-Feb & 8-Feb-22
Other NOx impurity		Less than 0.9 ppm			
Carbon Monoxide In Nitrogen	20.0 ppm	20.0 ppm	± 1% relative	(6) I-PB-352	1-Feb & 8-Feb-22

Reference Standard used in Assay

Reference Standard	Cylinder number	Concentration	Expiry date:
Nitric Oxide	133261SG	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 i550	FTIR-NO	1-Feb-2022
FTIR Spectrometers Nicolet i550	FTIR-CO	28-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:

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

Page 1 of 1

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บริษัท ลินด์ (ประเทศไทย) จำกัด (มหาชน)

เลขที่ใบอนุญาตประกอบกิจการ 0107537000005

ชั้น 15 อาคารทาวเวอร์ เอ 2/3 หมู่ 14 ถนนลาดพร้าว-ศรีนครินทร์ กม. 6.5 แขวงลาดพร้าว

แขวงคลองจั่น กรุงเทพมหานคร 10540 โทรศัพท์ (66) 2338-6100 โทรสาร (66) 2338-6333

โทรสารมือถือ: 105 หมู่ 5 แขวงคลองจั่น กรุงเทพมหานคร 24180

โทรศัพท์ (66) 38.573-479-93

โทรสาร (66) 38.570-323

Sukanya Parinyasoontorn

Signatory for and on behalf of Linde (Thailand) Co., Ltd.

Linde (Thailand) Public Company Limited

PLC Registration no. 0107537000005

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

PB-002/F006

Iss:K/2, 15 Oct 2021

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: 0330/22 Date of Issue: 8-Feb-2022 Expiry date: 8-Feb-2024
Material Details
Production Order: 90169720 Material Code: 436700-SK-34 Cylinder No.: D636021
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

Component	Nominal Concentration	Analysis Result ¹	Uncertainty ²	Method of Analysis ³	Assay Date
Nitric Oxide	80.0 ppm	78.5 ppm	± 1% relative	(6) I-PB-352	1-Feb & 8-Feb-22
Other NOx impurity		Less than 3.9 ppm			
Carbon Monoxide	80.0 ppm	81.1 ppm	± 1% relative	(6) I-PB-352	1-Feb & 8-Feb-22
In Nitrogen					

Reference Standard used in Assay

Reference Standard	Cylinder number	Concentration	Expiry date:
Nitric Oxide	D022358	70.7 ± 0.2 ppm	5-Mar-2023
Carbon Monoxide	D022358	70.8 ± 0.2 ppm	5-Mar-2023
In Nitrogen			

Analytical Instruments used in Assay

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
FTIR Spectrometers Nicolet iS50	FTIR-NO	10-Jan-2022
FTIR Spectrometers Nicolet iS50	FTIR-CO	8-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

Page 1 of 1

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บริษัท ลินด์ (ประเทศไทย) จำกัด (มหาชน)

เลขที่ใบแจ้งหนี้: 0107537000765

ชั้น 15 อาคารทาวเวอร์ 2/3 หมู่ 14 ถนนบางนา-ตราด กม. 6.5 แขวงบางนา
อ.บางนาเขต อ.บางนาเขต 10540 โทรศัพท์ (66) 2338-6100 โทรสาร (66) 2338-6333
โทรสารมือถือ: 105 หมู่ 5 คลังสินค้า อ.บางนาเขต แขวงบางนา 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/F004

Linde (Thailand) Public Company Limited Iss:K/2, 15 Oct 2021

PLC Registration no. 0107537000765

15th Floor, Bangna Tower A, 2/3 Moo 14, Bangna Trad KM. 6.5 Road, Banglaew
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 Khet Bangsue Bangkok 10800 Customer Tag No.:

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 M³ (nominal) Filling pressure: 145 bar (g) Valve: CGA 590 BRASS
Cylinder Owner: LINDE Cylinder Material: STEEL Cylinder Size: 47 L

Laboratory Report

Component	Nominal 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:

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 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)

เลขที่ใบแจ้งหนี้: 0107537000765

ชั้น 15 อาคารทาวเวอร์ 2/3 หมู่ 14 ถนนบางนา-ตราด กม. 6.5 แขวงบางนา
อ.บางนาเขต อ.บางนาเขต 10540 โทรศัพท์ (66) 2338-6100 โทรสาร (66) 2338-6333
โทรสารมือถือ: 105 หมู่ 5 คลังสินค้า อ.บางนาเขต แขวงบางนา 24180
โทรศัพท์ (66) 38.570-479-93 โทรสาร (66) 38.570-323

Linde (Thailand) Public Company Limited

PLC Registration no. 0107537000765

15th Floor, Bangna Tower A, 2/3 Moo 14, Bangna Trad KM. 6.5 Road, Banglaew
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



Request Service No. 098/66

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 25, 2023

Reference Standard No. M220177, M2302167S, M2303005N

Traceable to : Metrological Center SCI ECO Services Company Limited.

Thai Calibration Services CO., LTD.

Ambient Condition : Temperature 25.70 - 25.90 °C

Humidity 50.70 – 51.20 % RH

Calibrated By : Sasipa Jaidee Approved By : Narisa Poowasanpetch

(Miss Sasipa Jaidee)

(Miss Narisa Poowasanpetch)

Testing Officer

Chief of Technical Management

Date : 25/05/2023

Date : 25/05/2023

Issued Date : May, 26, 2023

Measurement Report

Request Service No. 098/66

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 25, 2023

Ambient Condition : Temperature 25.70-25.90 °C Relative humidity 50.70-51.20 % RH

Measurement data :

1. Repeatability of Reading :

Load (g)	Standard Deviation of Reading (g)	Maximum Difference between Successive Reading (g)
50	0.000052	0.0001
100	0.000071	0.0002
150	0.000067	0.0002
200	0.000071	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
50.00040	50.00062	50.00078	50.00000	50.00010	50.00040	0.00038

Issued Date : May 26, 2023

3. Departure from Nominal Value :

Reading (g)	Correction (g)	Uncertainty (+/- g)
0	0.000000	± 0.000008
0.5	-0.000017	± 0.000014
1	-0.000026	± 0.000018
10	-0.000099	± 0.000033
20	-0.000168	± 0.000046
40	-0.000339	± 0.000072
60	-0.00058	± 0.00011
80	-0.00059	± 0.00014
100	-0.00070	± 0.00016
120	-0.00069	± 0.00018
140	-0.00096	± 0.00020
160	-0.00082	± 0.00023
180	-0.00089	± 0.00024
200	-0.00118	± 0.00027

Calibrated by : Sasipa Jaidee

(Miss Sasipa Jaidee)

Testing Officer

Date : 25/05/2023

Approved By : Nanna Poowasanpetch

(Miss Narisa Poowasanpetch)

Chief of Technical Management

Date : 25/05/2023

Issued Date : May 26, 2023



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 23, 2023

Reference Standard No. M220177, M2302167S, M2303005N

Traceable to : Metrological Center SCI ECO Services Co., Ltd., Thai Calibration services Co., Ltd

Ambient Condition : Temperature 24.60-24.80 °C

Humidity 50.6-51.4 % RH

Calibrated By : Khemchuda Insom

(Miss Khemchuda Insom)

Testing Officer

Date : 24/05/2023

Approved By : Nanna Poowasanpetch

(Miss Narisa Poowasanpetch)

Chief of Technical Management

Date : 24/05/2023

Issued Date : May 24, 2023

Measurement Report

Request Service No.100/66

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 23,2023

Ambient Condition : Temperature 24.60-24.80 °C Relative humidity 50.6-51.4 % 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	0.00006	0.0002
200	0.00006	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
49.99976	49.99988	49.99984	49.99984	49.99990	49.99976	0.00012

Issued Date : May 24,2023

Request Service No. 100/66

Page 3 of 3

3. Departure from Nominal Value :

Reading (g)	Correction (g)	Uncertainty (+/- g)
0	0.00000	± 0.00008
1	+ 0.00004	± 0.00008
5	- 0.00005	± 0.00008
10	+ 0.00020	± 0.00008
20	+ 0.00027	± 0.00008
40	+ 0.00022	± 0.00010
60	+ 0.00018	± 0.00012
80	+ 0.00019	± 0.00014
100	+ 0.00028	± 0.00016
120	+ 0.00027	± 0.00018
140	+ 0.00036	± 0.00020
160	+ 0.00040	± 0.00022
180	+ 0.00058	± 0.00024
200	+ 0.00052	± 0.00027

Calibrated by :

Khemchuda Insorn

Approved By :

Narisa Poowasanpetch

(Miss Khemchuda Insorn)

(Miss Narisa Poowasanpetch)

Testing Officer

Chief of Technical Management

Date : 24/05/2023

Date : 24/05/2023

Issued Date : May 24,2023



Request Service No. 101/66

Page 1 of 3

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 25, 2023

Reference Standard No. M220177, M2302167S, M2303005N

Traceable to : Metrological Center SCI ECO Services Company Limited.

: THAI CALIBRATION SERVICES CO., LTD.

Ambient Condition : Temperature 25.20 - 25.50 °C

Humidity 49.7 – 53.4 % RH

Calibrated By : Janista Kui-on Approved By : Narisa Poowasanpetch

(Miss Janista Kui-on)

(Miss Narisa Poowasanpetch)

Testing Officer

Chief of Technical Management

Date : 25/05/2023

Date : 25/05/2023

Issued Date : May 25, 2023

Measurement Report

Request Service No. 101/66

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 25, 2023

Ambient Condition : Temperature 25.20-25.50 °C Relative humidity 49.7-53.4 % RH

Measurement data :

1. Repeatability of Reading :

Load (g)	Standard Deviation of Reading (g)	Maximum Difference between Successive Reading (g)
50	0.00006	0.0002
100	0.00008	0.0002
150	0.00010	0.0003
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
50.00002	50.00004	50.00022	50.00012	49.99998	49.99998	0.00024

Issued Date : May 25, 2023



BECTHAI BANGKOK EQUIPMENT & CHEMICAL CO., LTD.
CALIBRATION LABORATORY

300 Phaholyothin Road, Phayathai, Bangkok 10400, Thailand Tel: +66 2615-2929 Fax: +66 2615-2350-1
E-mail: bkk@becthai.com Website: www.becthai.com



Certificate No. : CAL-23-150

Page : 1 of 4

CERTIFICATE OF CALIBRATION

Equipment : Spectrophotometer
Manufacturer : Thermo Scientific
Model : Genesys 150 UV-VIS
Serial No. : 9A5Y332022
ID No. : N/A
Customer : Secot Company Limited
239 Rimklongprapa Road,
Bangsue, Bangkok 10800, Thailand
Location : Laboratory Room
Date of Receipt : 27 February 2023
Date of Calibration : 27 February 2023
Date of Issue : 8 March 2023
Ambient Temperature : (25±10) °C
Relative Humidity : (60±20) %
Condition As-Received : Used Item

Calibrated by

Anusit Boonmee
(Mr. Anusit Boonmee)

Calibration Engineer

Approved by

Jintana Sangthajaroenlap
(Ms. Jintana Sangthajaroenlap)

Calibration Manager

The reported expanded uncertainty of measurement was based on a combined standard uncertainty multiplied by a coverage factor $k=2$, 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 head of Calibration Laboratory.

Indicated values are valid for the state of the Spectrophotometer at the time of calibration only.

Request Service No.101/66

Page 3 of 3

3. Departure from Nominal Value :

Reading (g)	Correction (g)	Uncertainty (+/- g)
0	0.00000	± 0.00008
1	-0.00004	± 0.00008
5	-0.00003	± 0.00012
10	+0.00002	± 0.00010
20	-0.00007	± 0.00009
40	-0.00010	± 0.00012
60	-0.00022	± 0.00016
80	-0.00037	± 0.00014
100	-0.00007	± 0.00016
120	-0.00083	± 0.00018
140	-0.00078	± 0.00021
160	-0.00084	± 0.00023
180	-0.00085	± 0.00026
200	-0.00082	± 0.00027

Calibrated by : Janista Kui-on

(Miss Janista Kui-on)

Testing Officer

Date : 25/05/2023

Approved By : Narisa Poowasanpetch

(Miss Narisa Poowasanpetch)

Chief of Technical Management

Date : 25/05/2023

Issued Date : May 25, 2023



BECTHAI BANGKOK EQUIPMENT & CHEMICAL CO., LTD.
CALIBRATION LABORATORY

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 E-mail: bkk@becthai.com Website: www.becthai.com



Certificate No. : CAL-23-150

Page : 2 of 4

CALIBRATION REPORT

Conditions of this result of calibration

1. Reference Standard Material :

Material	Model	Serial No.	Cert.No.	Due date
Holmium Glass Filter	RM-HG	12705	98236	12 Feb 24
Didymium Glass Filter	RM-DG	13498	98233	12 Feb 24
Neutral Density Filter	RM-1N2N3N	8323	98259	13 Feb 24
Potassium Dichromate Solution	RM-06	23429	98252	12 Feb 24

2. Traceability : This certification is traceable to the International System of Unit maintained at;

The Starna Scientific Ltd. Accredited Calibration Laboratory No. 0659.

3. Method of calibration :

The calibration procedure was carried out according to ASTM E275-08 (2022) and ASTM E925-09 (2014).

4. Result of calibration :

(✓) without adjustment () after adjustment

5. Equipment Specifications:

Spectral Bandwidth :	2	nm
Data Interval :	0.2	nm
Scan Speed :	Slow	nm/min



BECTHAI BANGKOK EQUIPMENT & CHEMICAL CO., LTD.
CALIBRATION LABORATORY

300 Phaholyothin Road, Phayathai, Bangkok 10400, Thailand Tel: +66 2615-2929 Fax: +66 2615-2350-1
 E-mail: bkk@becthai.com Website: www.becthai.com



Certificate No. : CAL-23-150

Page : 3 of 4

CALIBRATION REPORT

Wavelength Calibration

Certified Values of Reference Material (nm)	Nominal Value (nm)	UUC* Reading (nm)	Error (nm)	Uncertainty of Measurement (± nm)
241.74	241.74	241.955	0.215	0.16
637.98	637.98	637.751	-0.229	0.17
879.27	879.27	879.075	-0.195	0.16

Photometric Calibration for Visible

Wavelength (nm)	Certified Values of Reference Material (A)	UUC* Reading (A)	Error (A)	Uncertainty of Measurement (± A)
420.0	Zero	0.000	0.0000	0.0028
	0.5716	0.573	0.0014	0.0044
	0.7358	0.733	-0.0028	0.0040
	1.0713	1.073	0.0017	0.0039
440.0	Zero	0.000	0.0000	0.0028
	0.561	0.562	0.0010	0.0042
	0.718	0.715	-0.0030	0.0037
	1.0459	1.047	0.0011	0.0037
465.0	Zero	0.000	0.0000	0.0028
	0.5111	0.512	0.0009	0.0044
	0.6618	0.660	-0.0018	0.0035
	0.9635	0.965	0.0015	0.0034
546.1	Zero	0.000	0.0000	0.0028
	0.5222	0.523	0.0008	0.0036
	0.6687	0.667	-0.0017	0.0031
	0.9768	0.978	0.0012	0.0043
590.0	Zero	0.000	0.0000	0.0028
	0.5541	0.554	-0.0001	0.0035
	0.6975	0.695	-0.0025	0.0031
	1.0206	1.021	0.0004	0.0044
635.0	Zero	0.000	0.0000	0.0028
	0.5398	0.540	0.0002	0.0035
	0.6658	0.664	-0.0018	0.0033
	0.9741	0.974	-0.0001	0.0044

Remark : Each individual filter is measured against the empty filter holder (blank) used to zero the Spectrophotometer.

Note:

UUC* : Unit Under Calibration



BECTHAI BANGKOK EQUIPMENT & CHEMICAL CO., LTD.
CALIBRATION LABORATORY

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จุฬาลงกรณ์มหาวิทยาลัย
 ศูนย์บริการการสอบเทียบมาตรฐาน
 Foundation for Industrial Development National Food Institute
 Food Industrial Laboratory Service Center



Certificate No. : CAL-23-150

Page : 4 of 4

CALIBRATION REPORT

Photometric Calibration for UV

Wavelength (nm)	Certified Values of Reference Material (A)	UUC* Reading (A)	Error (A)	Uncertainty of Measurement (\pm A)
235.0	Zero	0.000	0.0000	0.0050
	0.7345	0.735	0.0005	0.0075
257.0	Zero	0.000	0.0000	0.0050
	0.8498	0.849	-0.0008	0.0074
313.0	Zero	0.000	0.0000	0.0050
	0.2853	0.286	0.0007	0.0055
350.0	Zero	0.000	0.0000	0.0050
	0.6306	0.629	-0.0016	0.0063

Remark : The Potassium Dichromate Filled cells are measured against a Perchloric acid blank.

Note:

UUC* : Unit Under Calibration

- End of Report -

ISSUE: 5 REV:4

FM-CAL-33/2

Signature 15/05/61

Calibration Certificate

Certificate No.: 2203876-001-01
Client name: SECOT CO., LTD.
Address: 239 Rimklongprapa Road,
 Bangsue, Bangsue, Bangkok 10800

Page 1 of 3

Equipment: CHAMBER (Hot Air Oven)

Manufacturer: BINDER

Model: ED 53

Serial No.: 01-27152

ID No.: N/A

Order No.: 2203876

Operation No.: 2203876-001

Date of Receipt: 1 August 2022

Date of Calibration: 1 August 2022

Calibrated by Mr.Yothin Charoensuk
 Scientist

Approved by *P. Pheraphat*
 (Mr.Pheraphat Tuanjit) (for)
 Manager, Division of Calibration Laboratory

Date of Issue: 3 August 2022

Responsible for the Technical Management Team

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.

FC-009 Revision: 01 Date: 20-04-65

2005-2008: 100% 2009-2012: 100% 2013-2016: 100% 2017-2020: 100%
 2005-2008: 100% 2009-2012: 100% 2013-2016: 100% 2017-2020: 100%
 2005-2008: 100% 2009-2012: 100% 2013-2016: 100% 2017-2020: 100%



Calibration Report

Certificate No.: 2203876-001-01
Equipment: CHAMBER (Hot Air Oven)
Model: ED 53 **Serial No.:** 01-27152
Resolution: 1 °C **ID No.:** N/A
Manufacturer: BINDER
Date of Calibration: 1 August 2022

Page 2 of 3

Location: Laboratory, SECOT CO., LTD.
Environment Condition: Ambient Temperature (30 ± 1) °C
Relative Humidity (66 ± 5) %
Line Voltage (220 ± 5) 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	MY57003188	TE 650469-01	11 June 2023	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 104,110 and 180 °C
Fresh air Damper ☒ Open Position ☒
☒ Close Fan ☒
☒ Not Available

7. Result of Calibration : ☒ Without adjustment ☐ After adjustment

P. Sanghavit
3 Aug. 2022



Calibration Report

Certificate No.: 2203876-001-01
Equipment: CHAMBER (Hot Air Oven)
Model: ED 53 **Serial No.:** 01-27152
Resolution: 1 °C **ID No.:** N/A
Manufacturer: BINDER
Date of Calibration: 1 August 2022

Page 3 of 3

Calibration point: 104,110 and 180 °C

Calibration result:

Calibration Condition	Temperature (°C)	Relative Humidity (%)	Line Voltage (Volt)
MIN	29.8	61	215.0
MAX	30.9	71	225.0

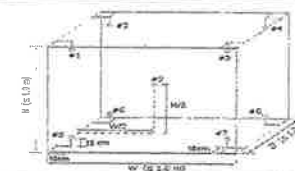


Table1 : Reporting of Temperature

Calibration point (°C)	Measured Temperature (°C) @ Sensor No. (Sensor No.9 is REF)									Uncertainty ± (°C)
	# 1	# 2	# 3	# 4	# 5	# 6	# 7	# 8	# 9	
104	103.88	104.38	104.57	104.17	103.06	102.86	103.29	103.14	102.94	0.80
110	109.86	110.37	110.58	110.15	109.05	108.83	109.31	109.16	108.93	0.81
180	179.86	180.90	180.31	180.22	179.43	179.49	179.88	180.20	179.67	0.90

Table 2 : Reporting of Characterization Result

UUC* Setting (°C)	UUC* reading (°C)			Stability ± (°C)	Uniformity (°C)	Overall Variation (°C)
	MIN	MAX	Average			
104	104	104	104	0.17	1.6	2.0
110	110	110	110	0.21	1.7	2.0
177	177	177	177	0.33	1.2	2.2

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 -----





TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250
TEL. 0-2717-3000-27 FAX. 0-2719-9484



Cert.No.: 23CH4
Page.: 1 of 3

Certificate of Calibration

Equipment : pH Meter
Manufacturer : Hanna
Model : HI98190
Serial No. : 06470022101
ID No. : pH No.19
Condition As-Received: Used Item
Received Date : 03 January 2023
Calibration Date : 04 January 2023
Reference : 2301-0006DN-1
Submitted by : Secot Co.,Ltd.
239 Rimklongprapa Road,
Bangsue, Bangkok 10800
Ambient Temperature : (25 ± 2.5) °C
Relative Humidity : (50 ± 15) %
Calibration Procedure : In - house method :
- CP-CH5 by direct measurement with standard
voltage calibrator and direct measurement with
certified reference material (CRM)
- CP-CH8 by comparison with standard thermometer

Calibrated by : Warakorn Lerngagtrakul

Approved by : 
Approved Signatory

(/) Malee Butkruea
() Saithip Meangmai
() Warakorn Lerngagtrakul

Issue Date : 10 January 2023

The Uncertainties are for a confidence probability of approximately 95%

This certificate may not be reproduced other than in full, except with the prior written
Approval of the head of Corporate Services 3 : Equipment Calibration and Testing Services.



Cert.No.: 23CH4

Page.: 2 of 3

Condition of this calibration result

1. Reference Standard Instrument : -

Instrument	Serial No.	ID No.	Cert. No.	Due Date
1) Ref. Standard Thermometer	4982054	110RC044	22I1306	27 Oct 2023

This certification is traceable to the International System of Unit maintained at:-

- Traceable to National Institute of Metrology (Thailand), NIMT

2. Certified Reference Materials : The measurement results are traceable to SI through CPA chem Ltd.,
ANSI-ASQ National Accreditation Board, Accredited No. AR-1835

Buffer Solution	Manufacturer	Lot No.	Exp. date
pH 4.008	CPA chem	826588	09 July 2024
pH 6.987	CPA chem	823322	20 June 2023
pH 10.008	CPA chem	826590	09 July 2023

3. This certificate is valid only to the item calibrated on date and place of calibration.

Calibration Results

Function : pH Measurement

Performing three buffers standard curve by using buffer nominal pH (4,7,10)

Unit Under Calibration	Standard pH Buffer Solution	Actual pH Reading	Actual mV Reading (mV)	Uncertainty of pH measurement (±)	Coverage factor k
pH Electrode S/N.: 0920044N	4.008	4.010	157.9	0.0044	2.00
	6.987	6.990	-1.6	0.0086	2.00
	10.008	10.007	-163.7	0.0065	2.00

Remark : - Can not connect the BNC because the plug does not match with the socket.





Cert.No.: 23CH4
Page.: 3 of 3

Calibration Results

Function : Temperature Measurement

(*) Without adjustment

This equipment was connected with Temperature Probe;

- Model : HI12963
- Serial No. : 0920044N

Dimension of probe;

- Length : 105 mm.
- Diameter : 14 mm.
- Immersion Depth : 100 mm.

Calibration Point (°C)	Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	Uncertainty of measurement (± °C)	Coverage factor k
20.0	20.002	20.0	-0.002	0.13	2.00
25.0	25.003	25.0	-0.003	0.13	2.00
30.0	30.005	30.0	-0.005	0.13	2.00
35.0	35.002	35.0	-0.002	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

Cert.No.: 22TW262
Page.: 1 of 2

Certificate of Testing

Equipment : DO Meter
Manufacturer : Hanna
Model : HI98193
Serial No. : 06110066101
ID No. :
Received Date : 22 November 2022
Test Date : 23 November 2022
Reference : 2211-0761DN-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 Sirthean
Approved by : Malee
Approved Signatory
(/) Malee Butkruea
() Saithip Meangmai
() Warakorn Lerngatrakul
Issue Date : 25 November 2022

B 0300997



Cert.No.: 22TW262
Page.: 2 of 2

Condition of this result of calibration

1. Reference Standard Instruments :

This certification is traceable to the International System of Unit through the reference standards laboratory of Industrial Calibration Center, Technology Promotion Association (Thailand-Japan).

Instruments	Serial No.	ID No.	Certificate No.	Due Date
1) Burette	-	130BU10	21CG1389	25 Mar 2023
2) Balance	1126143764	140RC004	22MM50	20 Sep 2023

2. Standard Material :-

Material	Manufacturer	Lot.No.	Assay
Sodium Thiosulfate pentahydrate	Merck	AM1763316	100.2%

Result : Dissolved Oxygen Meter Adjustment With Air 100 %

Dissolved Oxygen Probe No.: KC1N2993N

Titration Method (Azide Modification Method) (mg/L)	DO Meter Reading (mg/L)	Standard Deviation (mg/L)
8.14	8.14	0.0071

This report was certified only for the instrument we tested. It is allowable to use for study the system efficiency. The environmental impact control and present to organization it may concerned intend to use for advertising and referral purpose is prohibited. This report may not be reproduced other in full, without written approval of the laboratory

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TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250
TEL. 0-2717-3000-27 FAX. 0-2719-9484



Cert.No.: 22CH1624
Page.: 1 of 2

Certificate of Calibration

Equipment : Conductivity Meter
Manufacturer : Hanna
Model : HI98192
Serial No. : 05200045101
ID No. : -
Condition As-Received: Used Item
Received Date : 22 November 2022
Calibration Date : 23 November 2022
Reference : 2211-0761DN-2
Submitted by : Secot Co., Ltd.
239 Rimklongprapa Road,
Bangsue, Bangkok 10800

Ambient Temperature : (25 ± 2.5) °C
Relative Humidity : (50 ± 15) %
Calibration Procedure: In-house method :
- CP-CH6 : based on direct measurement by
using certified reference material (CRM)

Calibrated by : Walalak Sirithean

Approved by :

Malu
Approved Signatory

(/) Malee Butkruea
() Saithip Meangmai
() Warakorn Lemgagtrakul

Issue Date : 25 November 2022

The Uncertainties are for a confidence probability of approximately 95%

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Approval of the head of Corporate Services 3: Equipment Calibration and Testing Services.

A 0047740



Calibration Report

Certificate No.: 2203876-002-01
Equipment: CHAMBER (Incubator)
Model: ICP 400 Serial No.: K406.0004
Resolution: 0.1 °C ID No.: N/A
Manufacturer: MEMMERT

Date of Calibration: 1 August 2022

Page 2 of 3

Location: Laboratory, SECOT CO., LTD.

Environment Condition:
Ambient Temperature (29 ± 1) °C
Relative Humidity (66 ± 5) %
Line Voltage (220 ± 5) 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 RTD	MY57003188 CH#201-209/ RTD#201-209	TE 650469-01	11 June 2023	NATIONAL FOOD INSTITUTE

- 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

7. Result of Calibration : ☒ Without adjustment ☐ After adjustment

P. Janghant
3 Aug. 2022



Calibration Report

Certificate No.: 2203876-002-01
Equipment: CHAMBER (Incubator)
Model: ICP 400 Serial No.: K406.0004
Resolution: 0.1 °C ID No.: N/A
Manufacturer: MEMMERT

Date of Calibration: 1 August 2022

Page 3 of 3

Calibration point: 20.0 °C

Calibration result:

Calibration Condition	Temperature (°C)	Relative Humidity (%)	Line Voltage (Volt)
MIN	27.6	61	215.0
MAX	29.5	71	225.0

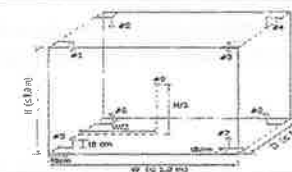


Table1 : Reporting of Temperature

Calibration point (°C)	Measured Temperature (°C) @ Sensor No. (Sensor No.9 is REF)									Uncertainty ± (°C)
	# 1	# 2	# 3	# 4	# 5	# 6	# 7	# 8	# 9	
20.0	20.01	20.09	20.11	20.07	20.18	20.09	20.05	19.99	20.09	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	0.10	0.10	0.37

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.: 2203876-003-01
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.: 2203876
Operation No.: 2203876-003
Date of Receipt: 1 August 2022
Date of Calibration: 1 August 2022

Calibrated by Mr.Yothin Charoensuk
 Scientist

Approved by


 (Mr.Pheraphat Tuanjit) (for)
 Manager, Division of Calibration Laboratory

Date of Issue: 3 August 2022
 Responsible for the Technical Management Team

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.: 2203876-003-01
Equipment: Water Bath
 Model: WB 29 Serial No.: I698.0051
 Resolution: 0.1 °C ID No.: N/A
 Manufacturer: MEMMERT

Date of Calibration: 1 August 2022

Page 2 of 3

Location: Laboratory, SECOT CO., LTD.
Environment Condition: Ambient Temperature (29 ± 1) °C
 Relative Humidity (66 ± 5) %
 Line Voltage (224 ± 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 (2016): 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	MY57003188	TE 650469-01	11 June 2023	NATIONAL FOOD INSTITUTE
	RTD	RTD#301-305 / CH#301-305			

- 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

7. Result of Calibration :
- | | |
|-------------------------------------|--------------------|
| <input checked="" type="checkbox"/> | Without adjustment |
| <input type="checkbox"/> | After adjustment |


 3 Aug. 2022

F-CS-012 Revision: 01 Date: 20-04-65





MAINTENANCE REPORT
ATOMIC ABSORPTION SPECTROPHOTOMETER MODEL
3110 + HGA600 + FIAS100 + AMALGAM

SERIAL NUMBER 311N6062102

DATE TESTED

December 16, 2565**1. OPTIC CHECKS**

A. Optical alignment condition (if necessary)

☐ OK

B. Condition of Mirrors, Lenses etc.

☐ OK

C. D2 and HCL beam adjust (if necessary)

☐ OK**2. ELECTRONICS CHECKS**

A. Power Supplies

+ 5.00 Vdc \pm 0.2 Vdc+ 5.0 Vdc+ 11.50 Vdc \pm 0.2 Vdc+ 11.4 Vdc+ 15.00 Vdc \pm 1.0 Vdc+ 15.2 Vdc- 15.00 Vdc \pm 1.0 Vdc- 14.9 Vdc

B. D2 Power supplies

+150 Vdc

NA Vdc

+ 450 Vdc

NA Vdc

C. PMT Power supply

- 250 Vdc

-249.1 Vdc**3. GAS SYSTEM CHECKS**

A. Leak test all internal and external gas box joints

☐ OK

B. All gas box safety features

☐ OK

C. Burner system including nebulizer and all o-ring and gasket

☐ OK

D. Drain system

☐ OK**4. FIAS CHECK**

A. Output power supplies

+5 VDC \pm 0.25 VDC.5.01 VDC.+40 VDC. \pm 0.5 VDC.40.02 VDC.

B. Valve and pump clean

☐ OK

MAINTENANCE REPORT
ATOMIC ABSORPTION SPECTROPHOTOMETER MODEL
3110 + HGA600 + FIAS100 + AMALGAM

SERIAL NUMBER 311N6062102

DATE TESTED

December 16, 2565**5. PERFORMANCE TEST FOR FLAME**

A. Performance Tests with PE standard.

A1. Run Std. Of Cu and Cr at 324.8 ; 357.9 nm, Concentration 4, 4 ppm respectivelyResults = 0.239, 0.240 Abs, with flow spoiler. respectivelyCharacteristic Concentration 0.074 ; 0.073 mg/L respectivelyA2. Run Std. of Pb at 283.3 nm; Concentration 20 ppmResults = 0.1960 Abs, with flow spoiler.Characteristic Concentration 0.449 mg/LB. Performance Tests (For C₂H₂ + N₂O Flame)Run Std. Of Al at 309.3 nm; Concentration 50 ppmResults = 0.237 Abs, with flow spoiler.Characteristic Concentration 0.928 mg/L**6. PERFORMANCE TEST FOR FIAS****ACTUAL VALUE**

A. Characteristic mass for Mercury

(500 ul of 10 ug/l Hg for 0.07 Abs.)

0.081 Abs.Characteristic Mass 314 pg / 0.0044 Abs.271.6 pg/0.0044 Abs.RSD \leq 2%0.06 %

B. Characteristic mass for Arsenic

(500 ul of 10 ug/l As for 0.45 Abs.)

0.447 Abs.Characteristic Mass 48 pg / 0.0044 Abs.49.2 pg/0.0044 Abs.RSD \leq 2%1.04 %

C. Characteristic mass for Mercury Amalgamation

(1000 ul of 1.0 ug/l Hg for 0.03 Abs.)

0.031 Abs.Characteristic Mass 147 pg / 0.0044 Abs.141.5 pg/0.0044 Abs.RSD \leq 2%1.84 %



MAINTENANCE REPORT
ATOMIC ABSORPTION SPECTROPHOTOMETER MODEL
3110 + HGA600 + FIAS100 + AMALGAM

SERIAL NUMBER <u>311N6062102</u>	DATE TESTED <u>December 16, 2565</u>
----------------------------------	--------------------------------------

7. PERFORMANCE CHECK FOR FURNACE

A. Internal & External gas flow	<input type="checkbox"/> OK
B. Contract Cylinder (replace if necessary)	<input type="checkbox"/> OK
C. Quartz Windows	<input type="checkbox"/> OK
D. Gas Tubing and Joins	<input type="checkbox"/> OK
E. Cooling System	<input type="checkbox"/> OK

8. AUTOSAMPLER CHECK

A. Arm and gears	<input type="checkbox"/> OK
B. Sample and Rinse Pump	<input type="checkbox"/> OK
C. Tray and Sensors	<input type="checkbox"/> OK

9. PERFORMANCE TEST FOR FURNACE

	ACTUAL VALUE	
Test run using Chromium		
1. Standard Deviation after 5 replicates of blank ≤ 0.005	<u>0.002</u>	
2. Characteristic mass (5 ug / L for Cr, 3 pg/0.0044 A-s)	<u>3</u>	pg / 0.0044 A-s
Peak Area	<u>0.150</u>	A-s
Relative Standard Deviation ≤ 2.0 %	<u>1.9</u>	%
Test run using Lead		
Characteristic mass (20 ug / L for Pb, 10 pg/0.0044 A-s)	<u>10</u>	pg / 0.0044 A-s
Peak Area	<u>0.180</u>	A-s
Relative Standard Deviation ≤ 2.0 %	<u>1.98</u>	%



MAINTENANCE REPORT
ATOMIC ABSORPTION SPECTROPHOTOMETER MODEL
3110 + HGA600 + FIAS100 + AMALGAM

SERIAL NUMBER <u>311N6062102</u>	DATE TESTED <u>December 16, 2565</u>
----------------------------------	--------------------------------------

Remarks :

NA Mean no applicant

This is to certify that the above tests have been performed and the configuration tested

☒ meets

☐ does not meet

the PerkinElmer Specifications listed on this certificate.

This certificate does not modify PerkinElmer's standard terms and condition of sale, including warranty terms.

TH ONE SOURCE CO., LTD.

Krungchai T.

(Krungchai Treevichien)

Customer Support Engineer

Agilent 5110 and 5100 ICP-OES Preventive Maintenance Checklist

Agilent Preventive Maintenance provides factory recommended service for your analytical systems to assure reliable operation and the accuracy of your results. Delivered by highly-trained and certified service engineers using genuine Agilent parts and supplies, Agilent Preventive Maintenance provides everything you need to reduce unplanned downtime and keep your systems operating at their peak.

For more information about Agilent Technologies services please visit our web site using the following URL <http://www.agilent.com/en-us/services/analytical-instrument-services>

Customer Information

- Customers should provide all necessary operating supplies upon request of the engineer.
- For customers using H⁺ applications, the instrument should be returned to its standard sample introduction system.
- A customer representative should be available to the engineer while performing the preventive maintenance procedures.
- Any parts, not included in the Parts Lists section of this document, are not part of the recommended Preventive Maintenance service, nor are they included in the price of this service.
- If a system requires the use of additional or special procedures and/or parts for the instrument service, then these must be ordered separately and charged as a repair, which may incur additional

Service Engineer's Responsibilities

- Only complete/printout pages that relate to the system being serviced.
- Complete empty fields with the relevant information.
- Complete the relevant checkboxes in the checklist using a "X" or tick mark "✓" in the checkbox.
- Complete Not Applicable check boxes to indicate services not delivered, as needed.
- Complete the PM service in the order of the tasks listed.
- Complete the Service Review section together with the customer.

Agilent 5110 and 5100 ICP-OES Preventive Maintenance Checklist

System Information

Instrument system name and ID	ICP 5110 VDV / HY16230003
Instrument system site and location	SECOT / 5th Fl Laboratory
List system component product numbers	List the serial numbers of each component
1. G 8015 A	1. HY16230003
2. G 8410 A	2. AU16181341
3. G 8475 A	3. HY16250001
4. G 8481	4. JB1641345
5.	5.
6.	6.
7.	7.
8.	8.
9.	9.
10.	10.

ICP-OES Configuration table	Circle the type or write in the type if other
Nebulizer Type	SeaSpray OneNeb other
Spray Chamber	Cyclonic Single Pass Cyclonic Double Pass other
Torch	Radial Dual View other
Injector Diameter	2.4mm 1.8mm 1.4mm 0.8mm other
Injector Material	Quartz Ceramic other

Agilent 5110 and 5100 ICP-OES Preventive Maintenance Checklist

General Preparation

- ☒ Discuss any specific questions or issues with the customer prior to starting.
- ☒ Review the instrument logbook.
- ☒ Perform general external inspection of system for cleanliness.
- ☒ Check for proper installation of safety-related parts, assemblies, sensors etc.
- ☒ Check for required firmware/software updates and verify with customers if they would like it installed.
- ☐ For HF application systems, if standard sample introduction system was not installed, ask the customer to install it. *N/A*
- ☒ Run Instrument Performance test and record results in Instrument Performance Test Results Table - Pre PM.

Inspect and clean the system

- ☒ Look for any obvious external damage or problems.
- ☒ Inspect water cooling hoses, gas lines and power cord for excessive wear or damage.
- ☒ Perform a general internal inspection of the system for excessive dust accumulation, clean if necessary.
- ☒ Inspect sample introduction components and record any required maintenance in the Service Engineer Comments and notify the customer as the required actions required.
- ☐ Record the instrument operating conditions in the ICP-OES Status Results Table.
- ☒ Replace the polychromator purge filter.
- ☐ Replace the radial pre-optics window
- ☒ Replace the axial pre-optics window for SVDV and VDV instruments.
- ☒ Check exhaust flow for the correct positive extraction at the exhaust duct to insure they meet minimum specifications.
- ☒ Replace air inlet dust filter.
- ☐ Replace high capacity air inlet dust filter element if installed. *N/A*
- ☒ Remove and clean instrument water inlet filter.

G8481A Cooling water system

- ☐ Section NOT Applicable
- ☒ Drain cooling fluid and remove any particles from the chiller reservoir
- ☒ Remove, clean and reinstall water inlet metal mesh filter.
- ☒ Re-fill with Polyclear cooling fluid
- ☒ Clean the cooling system Air filter and the condenser by compressed air or vacuum cleaner.

Agilent 5110 and 5100 ICP-OES Preventive Maintenance Checklist

SPS 3 Auto Sampler

- ☒ Section NOT Applicable
- ☐ Power cycle the autosampler and verify successful initialization.
- ☐ Inspect X and Z axis belts for wear. Replace is necessary.
- ☐ Clean X and Z axis slide shafts.
- ☐ Using customer's racks and the Agilent software move the sample probe to the 4 outermost corners and rinse port, ensure that the probe is approximately centered in the vial.

SPS 4 Auto Sampler

- ☐ Section NOT Applicable
- ☒ Clean the spill tray, rack location mat, end frames and chassis with a damp soft cloth and diluted mild detergent.
- ☒ Clean the auto sampler cover panels, if cover kit is installed, with domestic window cleaner
- ☒ Check the X-axis and Z-axis drive belts for cracks, splits, damaged teeth, excessive fraying, color changes or degradation from fumes.
- ☒ Check the X-axis, Theta-axis and Z-axis FFC cables for cracks, incorrect positioning, damaged edges or damaged connectors.
- ☒ Pump Tubing Replacement. Replace peristaltic pump tubing. Replace all tubing that goes from the rinse station to the pump and from the pump to the waste/rinse bottles

AVS 4. 6. 7

- ☒ Section 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

Instrument Adjustment

- ☒ Check position of Zn peak, adjust if required.
- ☒ Check Argon Ratio, adjust to specified value if required.
- ☒ Perform Detector Calibration.
- ☒ Perform Instrument Calibration.
- ☒ Run Instrument Performance Test and record results in Instrument Performance Test Results Table - Post PM.
- ☒ For systems using ICP Expert version 7.3 and above run the following Instrument tests and record the result in the Instrument Test Results Table
 - ☐ Subsystem Communications Test
 - ☒ Air Flow



Agilent 5110 and 5100 ICP-OES Preventive Maintenance Checklist

- ☒ Water Flow
- ☒ Gas Flows
- ☒ RF Generator
- ☒ Camera Test
- ☒ Optics Test
- ☒ Nebulizer Test

Instrument Performance Test Results Table

Note: These measurements do not form part of any specification and are for reference only.

	Pre PM Sensitivity Check		Post PM Sensitivity Check	
	Radial	Axial *	Radial	Axial*
Zn 213.857 nm SRBR	2356.3	7710.7	2822.9	7221.7
Mn 257.610 nm SRBR	8019.4	24552.7	7232.9	22099.7
Al 396.152 nm SBR	9.8	22.0	9.1	20.7
K 766.491 nm SBR	4.6	63.8	4.0	55.7

* 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



Agilent 5110 and 5100 ICP-OES Preventive Maintenance Checklist

ICP-OES Status Results Table

Note: These measurements do not form part of any specification and are for reference only.

Measurement	Standby Mode		Plasma On	
Mains Voltage	219.56	VAC	218.1	VAC
Mains Current	0.111	A	0.128	A
Instrument Temperature	25.7	°C	25.3	°C
RF Air Flow (sensor speed)	13.0	Hz	18.0	Hz
Plasma Exhaust Temperature	No measurement		56.4	°C
Water Flow Oscillator	No measurement		1.45	L/min
Water Flow Detector	1.28	L/min	1.24	L/min
Water Inlet Temperature	18.9	°C	20.6	°C
Polychromator Temperature	35.0	°C	35.0	°C
CCD Temperature	-39.8	°C	-39.8	°C
Thermal Stabilizer	35.0	°C	35.0	°C
Argon Supply Pressure	605.60	kPa	541.94	kPa
Purge Gas Supply Pressure*1	602.97	kPa	571.75	kPa
Option Gas Supply Pressure*1	N/A	kPa	N/A	kPa
Nebulizer Flow	No measurement		0.70	L/min
Nebulizer Back Pressure	No measurement		300.68	kPa
Plasma Gas Flow	No measurement		12.00	L/min
Auxiliary Gas Flow	No measurement		1.00	L/min
RF Power	No measurement		1200	W
RF Supply Current	No measurement		8.213	A
RF Supply Voltage	No measurement		194.700	V

*1 If option installed

**Agilent 5110 and 5100 ICP-OES
Preventive Maintenance Checklist**
ICP-OES Parts List Table

Part description	Part Number	Product / Model # where used	Quantity Consumed
Axial Pre-Optic Window	G8010-68014	G8010A, G8011A, G8014A/G8015A	1
Radial Pre-Optic Window	G8010-68015	All	1
Polyclear Cooling Fluid	G8292-80010	G8481A	1
Purge Gas Filter	G8010-60136	All	1
Air inlet filter	G8000-68002	All	1
High Capacity Air Filter	G8010-60189	Optional	1
Rotor seal for 6-7 port valve for AVS6/7	G8494-60002	G8494A/G8495	1
Rotor seal for 4 port valve for AVS4	G8493-60002	G8493A	1
Rinse solution to rinse station 2.5mm id x 1m	G8410-80123	SPS 4	1
Barb connector 2.5mm-1.5mm ID	G8410-80124	SPS 4	1
PVC waste tubing, 8mm od x 5mm id, 2m	G8410-80122	SPS 4	1
Additional Parts may be required from engineers stock:			
X axis drive belt	5410047500	SPS 3	1
Z axis drive belt	5410047400	SPS 3	1
Peristaltic pump tubing, PVC Solvaflex, 3 bridged,	3710049000	SPS 4	1

Restore system

For HF applications, ask the customer to reinstall their sample introduction system.

Leave system in an idle state: on and purging.

Guidance: If the PM service is performed prior to a qualification service, then use the qualification procedure as a guide for final instrument set up and checkout.

Service Review

- ☒ Affix the PM sticker to the system or instrument logbook based on the customer's request.
- ☐ Complete the Service Engineer Comments section below if there are additional comments.

**Agilent 5110 and 5100 ICP-OES
Preventive Maintenance Checklist**

- ☒ Review the service and any test results with the customer.
- ☒ If the instrument firmware was updated, record the details of the change in the Service Engineer's Comments box below or if necessary, in the customer's IQ records.

Service Engineer Comments (optional)

If there are any specific points you wish to note as part of performing the installation or other items of interest for the customer, please write in this box.

Other Important Customer Web Links

How to get information on your product:

- ☐ Literature Library - <http://www.agilent.com/en-us/products/icp-oes/icp-oes-systems/5110-icp-oes#literature>
- ☐ Need to know more? - <http://www.agilent.com/crosslab/university/>
- ☐ Need technical support, FAQs? - <http://www.agilent.com/en-us/support/landing/icp-oes>
- ☐ Need supplies? - www.agilent.com/chem/supplies

Service Completion

Service request number 6004692409 Date service completed 29 July 2021

Agilent signature Wojanik T. Customer signature _____

Document part number: G8014-90075



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.



Agilent 7890 GC Preventive Maintenance Checklist



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:
 - o **Safety**
https://www.agilent.com/cs/library/usermanuals/public/7890B_Safety.pdf
 - o **Installation and First Startup**
https://www.agilent.com/cs/library/usermanuals/public/7890B_Installation.pdf
 - o **Operation Manual**
https://www.agilent.com/cs/library/usermanuals/public/7890B_Operation.pdf
 - o **Maintaining Your GC**
https://www.agilent.com/cs/library/usermanuals/public/G3430-90052%207890B_Maintaining%20Guide.pdf

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DE number: 44166.759722222
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Service Engineer's Responsibilities

- Contact the customer and ensure that all necessary supplies are available before the preventive maintenance visit.
- Only select those pages that relate to the system or module being serviced.
- Complete empty fields with the relevant information.
- Complete the relevant checkboxes in the checklist using either a "X" or tick mark "✓".
- Check "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 / GCMS
Instrument System Site and Location	SECOT Co., Ltd.

List System Component Product Numbers	List the Serial Numbers of each Component
1. G3440A	CN10750035
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
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	N/A	N/A
Back detector output	N/A	N/A
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.

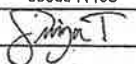
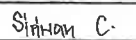
Part description	Part number	Product or model# where used	Quantity consumed
SSL Capillary Inlet PM kit, Splitless	5188-6497	7890A/B	1
SSL Capillary Inlet PM kit, split	5188-6496	7890A/B	1
SSL Capillary Ultra Inert Inlet Gold Seal with Washer	5190-6144	7890A/B	N/A
SSL Capillary Ultra Inert Inlet Splitless 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	N/A
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 6006041193 Date service completed 15 Jun, 2023
 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 SPIIFPM 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"/>
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Yes selected means that the task was done or the part was required.

No selected means that the task was not done or the part was not required.

Interim selected means that this task is recommended to be done at 6-month intervals.

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.

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
<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
<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
<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
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Check for evidence of poor vacuum – Turbo power demand, poor manifold vacuum, etc.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Clear air flow paths of dust.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	If vacuum is poor, then replace the diaphragm pump.
<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.

Yes/No	Interim/Major	Dry Mechanical vacuum pumps - Scroll
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Replace the tips seal on the IDP pump.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Check for evidence of poor vacuum – Turbo power demand, poor manifold vacuum, etc.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Replace the Exhaust Filter if required.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Discuss with customer the need for more frequent changes, if needed.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Inform customer that pump gas ballast should be installed all the time.
<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.

Yes/No	Interim/Major	Cleaning System and Filters
<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.

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 6006041193 Date service completed 15 Jun, 2023

Agilent signature [Signature] Customer signature Shihua 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

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 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

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	G1899-80039

MS Maintenance Supplies for 7000/7010 Series

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

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

Yes/No	Interim/Major/As needed	Description	Part number
--------	-------------------------	-------------	-------------

☐ ☐ ☐ ☒ Big Universal Trap, 1/8" fittings, Hydrogen, if required RMSHY-2

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	G3850-60021
<input type="checkbox"/>	<input type="checkbox"/>	CI 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"/>	PFOTD calibrant, 1 mL	8500-8510
<input type="checkbox"/>	<input type="checkbox"/>	PFET, IRM calibrant for GC QTOF 0.5 mL	6190-0531

MSD Maintenance Supplies 5973/5975/5977 Series

Yes/No	Interim/Major/As needed	Description	Part number
<input type="checkbox"/>	<input type="checkbox"/>	CI Interface tip seal (tip and spring combo)	G1999-60412
<input type="checkbox"/>	<input type="checkbox"/>	CI Interface tip seal (tip only)	G3870-20542
<input type="checkbox"/>	<input type="checkbox"/>	CI 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"/>	CI Interface tip seal - 7000	G1999-60412
<input type="checkbox"/>	<input type="checkbox"/>	CI Interface tip seal - 7010	G7002-60412
<input type="checkbox"/>	<input type="checkbox"/>	CI Interface tip seal (tip only)	G3870-20542
<input type="checkbox"/>	<input type="checkbox"/>	CI 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"/>	CI 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)	5080-5480
<input type="checkbox"/>	<input type="checkbox"/>	Gloves, clean, large	8650-0030
<input type="checkbox"/>	<input type="checkbox"/>	Gloves, clean, small	8650-0029



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.



Agilent 7890 GC Preventive Maintenance Checklist



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/G3490-90052%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

CN43201053

Instrument System Site and Location

SECOT, Bangkok

List System Component Product Numbers

List the Serial Numbers of each Component

1.	G7940A	CN13201053
2.	G4513A	CN13380106
3.	G4519A	CN13270081
4.		
5.		
6.		
7.		
8.		
9.		
10.		

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 Browser interface or 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	N/A	N/A
Back detector output		
AUX detector output		
Pressure decay test	Expected test result	Actual test result
Front inlet pressure decay test	Pass	Pass
Back inlet pressure decay test	Pass	N/A

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	1
SSL Capillary Inlet PM kit, split	5188-6496	7890A/B	1
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	
SSL Capillary Ultra Inert Inlet Low Pressure Drop Split Liner - with Glass Wool	5190-2295	7890A/B	
PP Inlet PM kit	5188-6498	7890A/B	
Split vent trap PM kit, single cartridge (for MMI, PTV & VI)	5188-6495	7890A/B	
MMI Cleaning Kit	G3510-60820	7890A/B	
PTV Septumless Head Rebuild Kit	5182-9747	7890A/B	
PTV Septumless Head Teflon Guide	5182-9748	7890A/B	
Ignitor (glow plug) assembly with O-ring	19231-60680	7890A/B	
FID Collector Rebuild/Cleaning Kit	G1531-67000	7890A/B	
Standard .011-inch FID Jet for capillary FID base	G1531-80560	7890A/B	
High Temperature .018-inch FID Jet for capillary FID base	G1531-80620	7890A/B	
Standard .018-inch FID Jet for packed column with packed FID base	18710-20119	7890A/B	
Standard .011-inch FID Jet for capillary column with packed/adaptable FID base	19244-80560	7890A/B	
High Temperature .018-inch FID Jet for capillary column with packed/adaptable FID base	19244-80620	7890A/B	
NPD Jet, universal fit, .011-inch ID	G1534-80580	7890A/B	
NPD Jet, universal fit, .011-inch ID Extended tip	G1534-80590	7890A/B	
SSL Capillary Ultra Inert Inlet Gold Seal with Washer	5190-6144	7890A/B	
SSL Capillary Ultra Inert Inlet Splitless Liner - Single taper with Glass Wool	5190-2293	7890A/B	
**FID Collector Replacement Kit, if needed	G1531-67001	7890A/B	

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.

Service Completion

Service request number 6005890913 Date service completed 22 Feb 2023
Agilent signature [Signature] Customer signature [Signature]
Total number of pages in this document _____

Agilent Preventive Maintenance Services

Agilent GCMS 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

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

- To access Agilent training and education, visit <http://www.agilent.com/chem/training> 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 Verification section
- Complete Signature Page and attach Signature Page to Service Order.

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.

Instrument Maintenance

Select the appropriate service to be performed.

- ☐ Interim Preventive Maintenance (when available, is typically 6 months or at the request of the customer)
- ☒ Major Preventive Maintenance (Yearly)
- ☐ Enhanced Preventive Maintenance (when available, is provided "As needed")

System Information

- ☐ Check this box if an instrument configuration report is attached instead of completing the table.

Instrument System Name and ID

Instrument System Site and Location

SECOT, Bangkok

List System Component Product Numbers

List the Serial Numbers of each Component

- | List System Component Product Numbers | List the Serial Numbers of each Component |
|---------------------------------------|---|
| 1. G3172A | U513743B01 |
| 2. | |
| 3. | |
| 4. | |
| 5. | |
| 6. | |
| 7. | |
| 8. | |
| 9. | |

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 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 checked="" type="checkbox"/>			
		<input checked="" type="checkbox"/>		
			<input checked="" type="checkbox"/>	
				<input checked="" type="checkbox"/>

Yes selected means that the task was done or the part was required.

No selected means that the task was not done or the part was not required.

Interim selected means that this task is recommended to be done at 6-month intervals.

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.

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

☐ Service Not Applicable

Interim / Major Preventive Maintenance – GC/MS

Yes/No	Interim/Major	Description
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Perform general inspection of system for cleanliness.
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Discuss any problems the customer is having with the instrument.
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Review customer maintenance records and exclude maintenance on recently serviced items.
<input checked="" type="checkbox"/>	<input checked="" 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.

Interim / Major Preventive Maintenance – System Checks

☐ Service Not Applicable

Yes/No	Interim/Major	System Checks
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Verify that calibration peaks were seen prior to starting the PM.
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Vent the instrument.
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Inspect vacuum hoses, pump, exhaust tubing, and power cords for excessive wear.
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Visually inspect calibrant levels – PFTBA PFTD (if appl.), IRM (if appl.). Refill if available.
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Look for any obvious external damage or problems.
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Clean air intake(s). Cosmetic cover(s) may need to be removed.
<input type="checkbox"/>	<input type="checkbox"/>	Verify system line voltage meets instrument specifications: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	For HydroInert systems, verify customer is running hydrogen: Yes <input type="checkbox"/> No <input type="checkbox"/>

Interim / Major Preventive Maintenance – Wet Mechanical vacuum pumps

☐ Service Not Applicable

Yes/No	<input checked="" type="checkbox"/>	Wet Mechanical vacuum pumps
Yes/No	Interim/Major	Description

<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Check for evidence of oil leakage. Check pump gasket for leakage.
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Drain and replace mechanical pump oil.
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Replace Oil Mist Filter if applicable.
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Discuss with customer the need for more frequent oil changes if the oil is dirty.
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Don't use mist filters with Chemical Ionization.
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" 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. Visually confirm that no oil returns up vacuum hose.

Interim / Major Preventive Maintenance – Dry Mechanical vacuum pumps – Diaphragm

☒ Service Not Applicable

Yes/No	<input type="checkbox"/>	<input type="checkbox"/>	Dry Mechanical vacuum pumps - Diaphragm	
Yes/No	Interim	Major	Description	
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Check for evidence of poor vacuum – Turbo power demand, poor manifold vacuum, etc.
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Clear air flow paths of dust.
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	If vacuum is poor, then replace the diaphragm pump.
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" 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.

Interim / Major Preventive Maintenance – Dry Mechanical vacuum pumps – Scroll

☒ Service Not Applicable

Yes/No	<input type="checkbox"/>	<input type="checkbox"/>	Dry Mechanical vacuum pumps - Scroll	
Yes/No	Interim	Major	Description	
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Replace the tips seal on the IDP pump.
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Check for evidence of poor vacuum – Turbo power demand, poor manifold vacuum, etc.
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Replace the Exhaust Filter if required.
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Discuss with customer the need for more frequent changes, if needed.
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Inform customer that pump gas ballast should be installed all the time.
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" 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.

Interim / Major Preventive Maintenance – Cleaning System and Filters

☐ Service Not Applicable

Cleaning System and Filters	
Yes/No Interim/Major	Description
Fans	
<input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	Remove dust from fans and vent covers.
<input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	Verify fans are functional and that there is enough space around the instrument for proper cooling.
Source cleaning (all sources except HydroInert)	
<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/>	Open analyzer and remove the source.
<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/>	Disassemble, Clean, Re-assemble source.
<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/>	Re-install source and close analyzer.
HydroInert Source	
<input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Source NOT to be abrasively cleaned. No cleaning required at PM. If a decrease in performance is observed, recommend to the customer that filaments, insulators (repeller and lens stack), extractor lens, and repeller lens may need to be replaced to restore performance. HydroInert source should not be run with helium carrier.
Filters	
<input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/>	Replace RMSH-2 Helium gas filter – if applicable.
<input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/>	Replace RMSN-2 Nitrogen gas filter – if applicable.
<input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/>	Replace RMSHY-2 Hydrogen gas filter – if applicable.
<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" 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"/> <input type="checkbox"/> <input checked="" type="checkbox"/>	CP17974 – Gas Clean Filter Kit GC/MS 1/8"; Mount and Filter – if applicable.
<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/>	CP17973 – Gas Clean Filter, Replacement Filter – if applicable.
<input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/>	5190-9071 – Methane Gas Filter – if applicable.

Interim / Major Preventive Maintenance – System Post Check

☐ Service Not Applicable

System post-check	
Yes/No Interim/Major	Description
<input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	Pump system back down. Wait until system stability has been achieved.
<input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	Verify system vacuum reading(s) via the gauge controller.
<input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	Leak Check
<input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	Verify system in manual tune
<input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	Compare against previous tune file report(s)
<input checked="" type="checkbox"/> <input type="checkbox"/> <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 type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	Check manually that you have calibration peaks.
<input checked="" type="checkbox"/> <input type="checkbox"/> <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 Comments box. Systems in a compliant environment may need additional documentation.
- ☒ Complete Signature Page and attach Signature Page to Service Order.

Test Results

Test Description	Expected Test Result	Actual Test Result
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Consumed PM Parts

Common MS Filters and Seals – 5973/5975/5977/7000/7010/7200/7250 Series

Part Description	Part Number	Interim	Major	As Needed
Helium gas filter – if required	RMSH-2		✓	✓
Nitrogen gas filter – if required	RMSN-2		✓	✓
Big Universal Trap, 1/8" fittings, Hydrogen, if required	RMSHY-2		✓	✓
Gas Clean Carrier Gas Kit for 7890 for Nitrogen or Helium; Bracket, Mount and Filter – if required	CP17988		✓	✓
Gas Clean Filter Kit GC/MS 1/8 in (complete replacement kit) – if required	CP17974		✓	✓
Gas Clean GS/MS Filter – if required	CP17973		✓	✓
Chemical Ionization Gas Purifier (CI systems) – if required	5190-9071		✓	✓
Agilent AVF Platinum, 1 quart	5191-5351	✓	✓	
Gas filters need to be changed only if required				

MS Maintenance Supplies for 5973/5975/5977 Series

Part Description	Part Number	Interim	Major	As Needed
Diffusion pump fluid (Diffusion Pump Models)	6040-0809 Qty 2	✓	✓	✓
IDP-3 Tip Seal Replacement Kit (IDP-3 Dry Pump Models)	G7077-67018	✓	✓	✓
IDP-3 Tip Seal Replacement Kit (no tools – CSD P/N)	5190-9551	✓	✓	✓
IDP-3 Tip Seal Replacement Kit (no tools – VPD P/N)	IDP3TS	✓	✓	✓
Filter element for IDP-3	REPLSLRFILTER 2	✓	✓	✓
DS42 Oil Mist Eliminator 3/4G & 3/8	SR03705556	✓	✓	✓
Exhaust oil mist trap (thread) Edwards/Pfeiffer	G1099-80039	✓	✓	✓
Repeller insulator	G1099-20133			✓
Lens stack insulator	G3870-20530			✓
Lens insulator for Extractor (ring insulator)	G3870-20443			✓
Hydroinert Extractor lens (5mm)	G7078-20909			✓
Hydroinert Repeller	G7078-20902			✓

MS Maintenance Supplies for 7000/7010 Series

Part Description	Part Number	Interim	Major	As Needed
Nitrogen gas filter	RMSN-2		✓	✓
IDP-10 Tip Seal Replacement Kit (IDP-10 Dry Scroll Pump Models)	G7004-67023		✓	✓
IDP-10 Tip Seal Replacement Kit (no tools – VPD P/N)	X3807-67000		✓	✓
Oil Mist Filter RV5	G6600-80043		✓	✓
Filter element for the IDP-10	REPLSLRFILTER 1		✓	✓
Repeller Insulator	G1099-20133			✓
Lens stack insulator	G3870-20530			✓
Lens insulator for Extractor (ring insulator)	G3870-20445			✓
HydroInert Extractor lens (9mm)	G7078-20909			✓
HydroInert Repeller	G7078-20902			✓

MS Maintenance Supplies for 7200/7250 Series

Part Description	Part Number	Interim	Major	As Needed
Nitrogen gas filter – if required	RMSN-2		✓	✓
RIS Probe Maintenance Kit (7200 Series only)	G7004-67023		✓	✓
DS202 Oil Mist Eliminator	X3807-67000		✓	✓
IDP-15 Tip Seal Replacement Kit (IDP-15 Dry Pump Models)	G6600-80043		✓	✓
IDP-15 Tip Seal Replacement Kit (no tools – VPD P/N)	REPLSLRFILTER 1		✓	✓
Filter element, for SH-110/SH-112/IDP-15 exhaust silencer	G1099-20133		✓	✓
DS 3/8 MAG. PLUG AND GASKET	G3870-20530		✓	✓

MS Maintenance Supplies for JetClean

Part Description	Part Number	Interim	Major	As Needed
Big Universal Trap, 1/8" fittings, Hydrogen, if required	RMSHY-2		✓	✓

Consumed Parts Reference
(Purchased by customer, not included as part of PM)

Common MSD Maintenance Supplies 5973/5975/5977/7000/7010/7200/7250 Series

Part Description	Part Number	Interim	Major	As Needed
El High Temperature Filaments	G7005-60061 Qty 2			✓
HES El Filaments	G7002-60001			✓
LE-El Filaments	G3850-60021			✓
CI High Temperature Filament – all MSDs	G7005-60072			✓
PFTBA GC/MS Tuning Standard calibrant	05971-60571			✓
PFTD calibrant, 1 mL	8500-8510			✓
PFET, IRM calibrant for GC QTOF 0.5 mL	5190-0531			✓

MSD Maintenance Supplies 5973/5975/5977 Series

Part Description	Part Number	Interim	Major	As Needed
CI interface tip seal (tip and spring combo)	G1999-60412			✓
CI interface tip seal (tip only)	G3870-20542			✓
CI interface tip seal spring (spring only)	G1999-20023			✓
Repeller insulator	G1099-20133 Qty 2			✓
Lens insulator/holder (HES)	G7002-20074			✓
Ring heater/sensor assembly (HES)	G7002-60043			✓
Ceramic insulator for Extractor (HES)	G7002-20064			✓
Transfer-Line Tip Cap, Threaded	G3870-20547			✓
Transfer-Line Tip Base, Threaded	G3870-20548			✓
Lens stack insulator	G3870-20530			✓
Lens insulator for Extractor (ring insulator)	G3870-20445			✓
HydroInert Extractor lens (9mm)	G7078-20909			✓
HydroInert Repeller	G7078-20902			✓

MS Maintenance Supplies for 7000/7010 Series

Part Description	Part Number	Interim	Major	As Needed
CI interface tip seal - 7000	G1999-60412			✓
CI interface tip seal - 7010	G7002-60412			✓
CI interface tip seal (tip only)	G3870-20542			✓
CI interface tip seal spring (spring only)	G1999-20023			✓
Repeller insulator - 7000	G1099-20133 Qty 2			✓
Lens insulator/holder (HES)	G7002-20074			✓
Ring heater/sensor assembly (HES)	G7002-60043			✓
Ceramic insulator for Extractor (HES)	G7002-20064			✓
Transfer-Line Tip Cap, Threaded	G3870-20547			✓
Transfer-Line Tip Base, Threaded	G3870-20548			✓
Lens stack insulator	G3870-20530			✓
Lens insulator for Extractor (ring insulator)	G3870-20445			✓
HydroInert Extractor lens (9mm)	G7078-20909			✓
HydroInert Repeller	G7078-20902			✓

MS Maintenance Supplies for 7200 Series

Part Description	Part Number	Interim	Major	As Needed
Extractor Lens Insulator	G7005-20133			✓
Ion Focus Insulator	G7005-20442			✓
Ring Heater/Sensor Assembly	G7005-60110			✓
RIS Xfer Tip	G7005-20542			✓
RIS Xfer Tip Spring	G7005-20024			✓

MS Maintenance Supplies for 7250 Series

Part Description	Part Number	Interim	Major	As Needed
Lens insulator/holder (HES)	G7002-20074			✓
Ring heater/sensor assembly (HES)	G7002-60043			✓
Ceramic insulator for Extractor (HES)	G7002-20064			✓
Transfer-Line Tip Cap, Threaded	G3870-20547			✓

Part Description	Part Number	Interim	Major	As Needed
Transfer-Line Tip Base, Threaded	G3870-20548			✓
EI Extractor Transfer Tip	G3870-20542			✓
CI Tip Compression Spring	G1999-20023			✓

MS Maintenance Supplies for Intuvo 9000 MS Series

Part Description	Part Number	Interim	Major	As Needed
Swaged MS Tail - Packaged	G4590-60009			✓
Swaged MS Tail (HES) - Packaged	G4590-60109			✓

Common MS Maintenance Supplies

Part Description	Part Number	Interim	Major	As Needed
Abrasive paper, 30 um	5051-5396			✓
Alumina powder	393706201			✓
Cloths, clean (pkg of 15)	05980-60051			✓
Cloths, cleaning (pkg of 300)	9310-4828			✓
Cotton swabs (pkg of 100)	5080-5400			✓
Gloves, clean, large	8550-0030			✓
Gloves, clean, small	8650-0029			✓



Signature Page

Service Engineer Comments (optional)

If there are any specific points you wish to note as part of performing the service review or other items of interest for the customer, please write in this box.

Service Verification

Service Request Number: 60058708913

Date of Service Completion: 22 Feb 2023

Service Engineer Name: SMV N.

Customer Name:

Service Engineer Signature:

Total number of pages in this document:



Teledyne Tekmar ATOMX Purge and Trap Preventive Maintenance Checklist - Standard



Agilent Preventive Maintenance provides factory recommended service for your analytical systems to assure reliable operation and the accuracy of your results. Delivered by highly-trained and certified service engineers using genuine Agilent parts and supplies, Agilent Preventive Maintenance provides everything you need to reduce unplanned downtime and keep your systems operating at their peak.

For more information about Agilent Technologies services please visit our web site using the following URL <http://www.chem.agilent.com/en-us/products/services/pages/default.aspx>

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 additional or special procedures and/or parts for the instrument service, then these must be ordered separately and charged as a repair, which may incur additional costs.

Service Engineer's Responsibilities

- Only complete/printout 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 a "X" or tick mark "✓" in the checkbox.
- Complete Not Applicable check boxes to indicate services not delivered, as needed.
- Complete the PM service in the order of the tasks listed.
- Complete the Service Review section together with the customer.

System Information

Guidance

- ☐ Check this box if an instrument configuration report is attached instead of completing the table.

Instrument system name and ID	
Instrument system site and location	SECOT, Bangkok
List system component product numbers	List the serial numbers of each component
1. THR-ATOMX	1. 0913241002
2.	2.
3.	3.
4.	4.
5.	5.
6.	6.
7.	7.
8.	8.
9.	9.
10.	10.

Preparation

- ☒ Discuss any specific issues with the customer prior to starting.
- ☒ Review the instrument logbook.
- ☒ Save instrument control settings before starting the procedure.
- ☒ Perform general inspection of system for cleanliness
- ☒ Check for proper installation of safety-related parts, assemblies, sensors etc
- ☒ Check for required firmware updates and verify with customers if they would like it installed.

Check External Supplies

- ☐ Section NOT Applicable
- ☒ Verify the gas source is supplying an input pressure of 50 - 100 psi to the ATOMX. If the customer is using a gas cylinder, verify the cylinder is at 500+ psi.
- ☒ Verify that the waste container has sufficient volume to contain the waste generated. Empty if necessary.
- ☒ Replace the DI water supply with fresh DI water.
 - ☒ Make sure the DI water supply is sufficient for sample analysis (1 Liter minimum)
- ☒ Make sure the methanol supply is sufficient for sample analysis.

Atomx Leak and Pressure Check

- ☐ Section NOT Applicable
- ☒ Scan through the sample log to verify that the purge pressures are staying consistent throughout the daily runs.
- ☒ Use the Teklink software to check the standard pressure.
- ☒ Run a leak check to ensure that the unit is leak tight.

Inspect ATOMX Hardware

- ☐ Section NOT Applicable
- ☒ Check the tray vial holes for foreign particles. Clean if necessary.
- ☒ Inspect the needle for particles or sample build up. Clean if necessary.
- ☒ Inspect the sparger glassware for damage and/or discoloration that could restrict flow or cause contamination. Replace if necessary.
- ☒ Inspect the drain tubing for clogging. Replace the drain line if necessary.
- ☒ Lubricate the ATOMX Carousel Drive. Refer to the diagram on page 6-25 of the ATOMX User Manual for lubrication points. Teledyne Tekmar recommends using DuPont Krytox lubrication.
- ☒ Lubricate the ATOMX Elevator. Refer to the diagram on page 6-32 of the ATOMX User Manual for lubrication points. Teledyne Tekmar recommends using DuPont Krytox lubrication.

Restore Instrument

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.

Teledyne Tekmar ATOMX Purge and Trap
Preventive Maintenance Checklist - Standard



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Service Review

- ☐ Attach available reports/printouts of all tests to this documentation.
- ☐ Record the PM service activity in the customer's instrument 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 below if there are additional comments
- ☐ Review the service and any test results with the customer.
- ☐ If the Instrument firmware was updated, record the details of the change in the Service Engineer's Comments box below or if necessary, in the customer's IQ records.

Product or Product Type Test Results Table

Test Description	Expected Test Result	Actual Test Result
Leak Test	Pass	Pass

Product or Product Type Parts List Table

Part Description	Part Number	Product or Model# where used	Quantity Consumed
Sparger Glassware	Ask the customer what size sparger glassware they are using, refer to the ATOMX parts list for part numbers.	TMR-ATOMX	1
Lubricant, Dupont Krytox	15-0293-000	TMR-ATOMX	1
Tubing, Drain, Self Retracting	15-0087-002	TMR-ATOMX	1

Issued: 30-09-2019, Revision:02

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Select pages for required products or Page 4 of 5

Teledyne Tekmar ATOMX Purge and Trap
Preventive Maintenance Checklist - Standard



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Service Engineer Comments (optional)

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 in this box.

Other Important Customer Web Links

- ☐ How to get information on your product Literature Library - <http://www.agilent.com/chem/library>
- ☐ Need to know more? - www.agilent.com/chem/education
- ☐ Need technical support, FAQs? - www.agilent.com/chem/techsupp
- ☐ Need supplies? - www.agilent.com/chem/supplies

Service Completion

Service request number 6005830813 Date service completed 22 Feb 2023

Agilent signature [Signature] Customer signature [Signature]

Number of pages in this document _____

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Select pages for required products or Page 5 of 5



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.

Agilent 7890 GC Preventive Maintenance Checklist



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:
 - o Safety
https://www.agilent.com/cs/library/usermanuals/public/7890B_Safety.pdf
 - o Installation and First Startup
https://www.agilent.com/cs/library/usermanuals/Public/7890B_Installation.pdf
 - o Operation Manual
https://www.agilent.com/cs/library/usermanuals/Public/7890B_Operation.pdf
 - o Maintaining Your GC
https://www.agilent.com/cs/library/usermanuals/public/GS430-90052%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

Ge7890A

US10943001

Instrument System Site and Location

Seacot Co., Ltd. Instrument room.

List System Component Product Numbers

List the Serial Numbers of each Component

1. G3490A
2. G4513A
3. G4514A
- 4.
- 5.
- 6.
- 7.
- 8.
- 9.
- 10.

US10943001
 CN11350193
 CN93901235

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	N/A	17.4
Back detector output	N/A	34.2
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	1
SSL Capillary Inlet PM kit, split	5188-6496	7890A/B	1
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	G3510-60620	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	1
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.

Service Completion

Service request number

606041153

Agilent signature

SA

Customer signature

29 May 2023
Mawana Lawanayakul

Date service completed

Total number of pages in this document

9 pages



Certificate of Completion

Learner Name:

Saengthan Saeng Tarek

Title Of Course:

AN-ASP/CE/CSE-GC-1-001-M: 7890/7820 GC and OL GC Standalone Chemstation I&F Service

Completion Date:

November 23, 2014

Certified By Company:

Learning at Agilent

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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.



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Tel: +66 2709 4860 Fax: +66 2324 0917



Certificate No.: CP20230033EA
Operation No.: CP2023010024

Certificate of Calibration

Equipment: Sound Calibrator
Manufacturer: RION
Model/Type: NC-74
Serial No.: 34283648
ID No.:
Customer: SECOT Co.,Ltd.
Address: 239 Rimklongprapa Rd., Bangsue,
Bangkok 10800 Thailand
Received Date: 10 January 2023
Calibrated Date: 13 January 2023
Issued Date: 16 January 2023
Calibrated by: Ms. Juntaporn Kunhakom

Approved by:

(Mr. Sittichai Swaksuriyawong)
Group Manager

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ELECTRICAL AND ELECTRONICS INSTITUTE
FOUNDATION FOR INDUSTRIAL DEVELOPMENT

Certificate No.: CP20230033EA

Calibration Report

Equipment: Sound Calibrator
Manufacturer: RION
Model/Type: NC-74
Serial No.: 34283648
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-1020-22	14 June 2023
2) Waveform Generator	33511B	MY52302264	CK20220058EA	19 June 2023
3) Audio Analyzing DMM	2015-P	4079144	E1U221042	16 March 2023
4) Pressure humidity and Temperature Transmitter	PTU301	F0640002	CL1-P220024 CD20220165EA	17 March 2023 24 July 2023

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

Norminal Frequency (Hz)	Specified Sound Pressure level (dB)	Measured value (dB)	Deviated value ^[3] (dB)	Acceptance limit ^[3] (dB)
1000	94	94.24	0.24	±0.25

2. Function : Frequency

Norminal Sound Pressure level (dB)	Specified Frequency (Hz)	Measured value (Hz)	Deviated value ^[3] (%)	Acceptance limit ^[3] (%)
94	1000	1003.0	0.3	±0.7



ELECTRICAL AND ELECTRONICS INSTITUTE
FOUNDATION FOR INDUSTRIAL DEVELOPMENT

Certificate No.: CP20230033EA

Calibration Report

3. Function : Total distortion + noise

Normal Sound Pressure level (dB)	Normal Frequency (Hz)	Measured value ^[4] (%)	Acceptance limit ^[5] (%)
94	1000	1.3	2.5

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. Using the 1/2-inch microphone adaptor NC-74-002.
2. Acceptance limit was IEC 60942:2017 Class 1.
3. The coverage factor $k = 2.00$

-- End of Report --

Sheet No. : NC-74-2023-026



SOUND LEVEL METER CALIBRATION

Calibration Location: SECOT

Calibration Date: May 16, 23

SOUND LEVEL CALIBRATOR

Brand	Model	Serial No.	Calibrated (dB)	Frequency (Hz)
RION	NC-74	34283648	94.0	1000

No.	Brand	Model	Serial No.	Microphone Serial No.	SLM Reading (dB)	dB Adjust
13	RION	NL-21	00521703	85215	93.8	0.2
26	RION	NL-21	00187481	117664	94.1	-0.1
34	RION	NL-21	00187489	117711	93.9	0.1
42	RION	NL-21	00187497	117801	93.6	0.4
50	RION	NL-21	00187505	117809	93.7	0.3
56	RION	NL-21	00187511	117816	93.7	0.3
66	RION	NL-21	00487723	118993	93.7	0.3
77	RION	NL-21	00487734	119006	93.6	0.4
95	RION	NL-21	00198277	123480	93.8	0.2

Calibrated by :

Approved by :

Predon S.



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Certificate No.: CP20220368EA

Operation No.: CP2022120011

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: 14 December 2022

Calibrated Date: 20 December 2022

Issued Date: 23 December 2022

Calibrated by: Ms. Juntaporn Kunhakom

Approved by:

(Mr. Sittichai Swaksuriyawong)

Group Manager

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FOUNDATION FOR INDUSTRIAL DEVELOPMENT

Certificate No.: CP20220368EA

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-1020-22	14 June 2023
2) Waveform Generator	33511B	MY52302264	CK20220058EA	19 June 2023
3) Audio Analyzing DMM	2015-P	4079144	E1U221042	16 March 2023
4) Pressure humidity and Temperature Transmitter	PTU301	F0640002	CL1-P220024 CD20220165EA	17 March 2023 24 July 2023

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

Nominal Frequency (Hz)	Specified Sound Pressure level (dB)	Measured value (dB)	Deviated value ^[1] (dB)	Acceptance limit ^[3] (dB)
1000	94	93.90	-0.10	±0.25

2. Function : Frequency

Normal Sound Pressure level (dB)	Specified Frequency (Hz)	Measured value (Hz)	Deviated value ^[2] (%)	Acceptance limit ^[3] (%)
94	1000	1000.3	0.0	±0.7

Certificate No.: CP20220368EA

Calibration Report

3. Function : Total distortion + noise

Norminal Sound Pressure level (dB)	Norminal Frequency (Hz)	Measured value ^[4] (%)	Acceptance limit ^[5] (%)
94	1000	0.9	2.5

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. The coverage factor $k = 2.00$

-- End of Report --



SOUND LEVEL METER CALIBRATION

Calibration Location: SECOT

Calibration Date: May 16, 23

SOUND LEVEL CALIBRATOR

Brand	Model	Serial No.	Calibrated (dB)	Frequency (Hz)
Cirrus	CR:515	94296	94.0	1000

No.	Brand	Model	Serial No.	Effective Calibration Level (dB)	SLM Reading (dB)	Offset (dB)
19	Cirrus	CR162B	G300990	93.7	93.7	0.2
40	Cirrus	CR162B	G302740	93.7	93.7	0.2

Calibrated by :



Approved by :

Preda S.



SOUND LEVEL METER CALIBRATION

Calibration Location: SECOT

Calibration Date: May 5, 23

SOUND LEVEL CALIBRATOR

Brand	Model	Serial No.	Calibrated (dB)	Frequency (Hz)
Cirrus	CR:515	94296	94.0	1000

No.	Brand	Model	Serial No.	Effective Calibration Level (dB)	SLM Reading (dB)	Offset (dB)
1	SCARLET	ST-21D	820722	93.7	93.7	0.0
2	SCARLET	ST-21D	820723	93.7	93.7	0.1
3	SCARLET	ST-21D	820724	93.7	93.7	0.2
4	SCARLET	ST-21D	820725	93.7	93.7	0.1
5	SCARLET	ST-21D	820726	93.7	93.7	0.1
7	SCARLET	ST-21D	820728	93.7	93.7	0.0
8	SCARLET	ST-21D	820729	93.7	93.7	0.2
10	SCARLET	ST-21D	820731	93.7	93.7	0.0

Calibrated by :

Approved by :

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NAC MTA
NAC-TIS-TIS 17025
CALIBRATION 0119

Certificate No.: CP20230032EA

Operation No.: CP2023010023

Certificate of Calibration

Equipment: Sound Calibrator

Manufacturer: CASELLA

Model/Type: CEL-120/2

Serial No.: 2839225

ID No.: -

Customer: SECOT Co.,Ltd.

Address: 239 Rimklongprapa Rd., Bangsue,
Bangkok 10800 Thailand

Received Date: 10 January 2023

Calibrated Date: 13 January 2023

Issued Date: 16 January 2023

Calibrated by: Ms. Juntaporn Kunhakom

Approved by:

(Mr. Sittichai Swaksuriyawong)
Group Manager

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Certificate No.: CP20230032EA

Calibration Report

Equipment: Sound Calibrator
Manufacturer: CASELLA
Model/Type: CEL-120/2
Serial No.: 2839225
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-1020-22	14 June 2023
2) Waveform Generator	33511B	MY52302264	CK20220058EA	19 June 2023
3) Audio Analyzing DMM	2015-P	4079144	E1U221042	16 March 2023
4) Pressure humidity and Temperature Transmitter	PTU301	F0640002	CL1-P220024 CD20220165EA	17 March 2023 24 July 2023

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 Frequency (Hz)	Specified Sound Pressure level (dB)	Measured value (dB)	Deviated value ^[1] (dB)	Acceptance limit ^[3] (dB)
1000	114	114.25	0.25	±0.40

2. Function : Frequency

Normal Sound Pressure level (dB)	Specified Frequency (Hz)	Measured value (Hz)	Deviated value ^[2] (%)	Acceptance limit ^[3] (%)
114	1000	1000.0	0.0	±1.7

Certificate No.: CP20230032EA

Calibration Report

3. Function : Total distortion + noise

Normal Sound Pressure level (dB)	Normal Frequency (Hz)	Measured value ^[4] (%)	Acceptance limit ^[5] (%)
114	1000	0.2	3.0

Uncertainty of measurement

Function	Uncertainty	Maximum-permitted uncertainty of measurement
Sound pressure level	0.10 dB	0.35 dB
Frequency	0.10 %	0.20 %
Total distortion + noise	0.40 %	1.00 %

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 2.

2. The coverage factor $k = 2.00$

-- End of Report --



SOUND LEVEL METER CALIBRATION

Calibration Location: SECOT

Calibration Date: Feb 23, 23

SOUND LEVEL CALIBRATOR

Brand	Model	Serial No.	Calibrated (dB)	Frequency (Hz)		
CASELLA	CEL120/2	2839225	114.0	1000		
No.	Brand	Model	Serial No.	Microphone Serial No.	SLM Reading (dB)	dB Adjust
2	CASELLA	CEL-246	1443618	1443618	114.3	-0.3
5	CASELLA	CEL-246	1443838	1443838	113.8	0.2
6	CASELLA	CEL-246	3173108	3173108	113.8	0.2
8	CASELLA	CEL-246	3173135	3173135	113.7	0.3
14	CASELLA	CEL-246	3173306	3173306	113.9	0.1
15	CASELLA	CEL-246	3173311	3173311	114.0	0.0
16	CASELLA	CEL-246	3173312	3173312	114.0	0.0
17	CASELLA	CEL-246	3173318	3173318	113.9	0.1

Calibrated by :

Lodanan W.

Approved by :

Sule Sathmanon

CERTIFICATE OF CALIBRATION

ISSUED BY Noisemeters

DATE OF ISSUE 16 March 2023 CERTIFICATE NUMBER 189327

NoiseMeters

NoiseMeters
Acoustic House
Bridlington Road
Hunmanby
YO14 0PH
United Kingdom
www.noisemeters.com

Page 1 of 1

Test engineer:
Nigel Smith
Electronically signed:

doseBadge Reader

Instrument

Manufacturer: Cirrus Research plc
Model Number: RC:110A

Serial Number: 95168
Notes:

Calibration Procedure

The tests were carried out in accordance with the requirements of IEC 60942:2003 where applicable.

Date of Calibration: 16 March 2023

Functionality Results

Function	Result
Keypad	Pass
Battery Power	Pass
Display	Pass
Communication	Pass
2 way IR link	Pass
Clock	Pass

Calibration Results

	Level (dB)	Frequency (Hz)	Distortion (% THD + Noise)
Initial	113.90	999.3	0.61
Adjusted	114.00	999.2	0.61
Uncertainty	± 0.11	± 0.14	± 0.10
Tolerances	± 0.60	± 2.00	± 4.00

Environmental Conditions

Pressure: 99.27 kPa
Temperature: 23.3 °C
Humidity: 37.6 %

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%.



NOISE DOSE METER CALIBRATION

Calibration Location: SECOT

Calibration Date: Feb 23, 23

ACOUSTIC CALIBRATOR

Brand	Model	Serial No.	Calibrated (dB)	Frequency (Hz)
CIRRUS	RC 110A	95168	114.00	1000

No.	Brand	Model	Serial No.	Reading (dB)	dB Adjust
1	Cirrus	CR110A	CA2938	114.0	0.0
2	Cirrus	CR110A	CA2939	114.2	-0.2
3	Cirrus	CR110A	CB1048	114.1	-0.1

Calibrated by :

Ladawan W.

Approved by :

Suk Suthmanon



NOISE DOSE METER CALIBRATION

Calibration Location: SECOT

Calibration Date: May 5, 23

ACOUSTIC CALIBRATOR

Brand	Model	Serial No.	Calibrated (dB)	Frequency (Hz)
CIRRUS	RC 110A	95168	114.00	1000

No.	Brand	Model	Serial No.	Reading (dB)	dB Adjust
1	Cirrus	CR110A	CB1023	113.1	0.9
2	Cirrus	CR110A	CB1025	114.0	0.0
3	Cirrus	CR110A	CB1026	113.9	0.1

Calibrated by :

Approved by :

Suk Suthmanon



NOISE DOSE METER CALIBRATION

Calibration Location: SECOT

Calibration Date: Jun 20, 23

ACOUSTIC CALIBRATOR

Brand	Model	Serial No.	Calibrated (dB)	Frequency (Hz)
CIRRUS	RC 110A	95168	114.00	1000

No.	Brand	Model	Serial No.	Reading (dB)	dB Adjust
1	Cirrus	CR110A	CB1023	114.1	-0.1

CERTIFICATE OF CALIBRATION

ISSUED BY Noisemeters

DATE OF ISSUE

28 April 2023

CERTIFICATE NUMBER 191319

NoiseMeters
Acoustic House
Bridlington Road
Hunmanby
YO14 0PH
United Kingdom
www.noisemeters.com

Page 1 of 1

Test engineer:
Rebecca Thomas
Electronically signed:

doseBadge Reader

Instrument

Manufacturer: Pulsar Instruments Plc
Model Number: Model 22R

Serial Number: 79781
Notes:

Calibration Procedure

The tests were carried out in accordance with the requirements of IEC 60942:2003 where applicable.

Date of Calibration: 26 April 2023

Functionality Results

Function	Result
Keypad	Pass
Battery Power	Pass
Display	Pass
Communication	Pass
2 way IR link	Pass
Clock	Pass

Calibration Results

	Level (dB)	Frequency (Hz)	Distortion (% THD + Noise)
Result	114.00	999.0	0.47
Uncertainty	± 0.11	± 0.14	± 0.10
Tolerances	± 0.60	± 2.00	± 4.00

No adjustments were made during this calibration.

Environmental Conditions

Pressure: 101.00 kPa
Temperature: 22.4 °C
Humidity: 33.7 %

Notes

This certificate provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory. The results within this certificate relate only to the items calibrated. The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a coverage probability of approximately 95%.

Calibrated by :

Approved by :



NOISE DOSE METER CALIBRATION

Calibration Location: SECOT

Calibration Date: Feb 23, 23

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	PB643	113.6	0.4
2	Pulsar	22	PB644	114.0	0.0

Calibrated by :

Ladawan W.

Approved by :

Suli Suthanamon

NOISE DOSE METER CALIBRATION

Calibration Location: SECOT

Calibration Date: Mar 28, 23

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	113.8	0.2

Calibrated by :

Ladawan W.

Approved by :

Suli Suthanamon



NOISE DOSE METER CALIBRATION

Calibration Location: SECOT

Calibration Date: Jun 20, 23

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	PB638	113.4	0.6

Calibrated by :

Approved by :

Saul Sudhawan

ภาคผนวก จ

หนังสืออนุญาตขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน
จากกรมโรงงานอุตสาหกรรม

คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกชน

วันที่ 7 เดือน เมษายน พ.ศ. 2566

ข้าพเจ้า () ผู้รับใบอนุญาตประกอบกิจการโรงงาน.....

(/) บริษัท/ห้างหุ้นส่วนจำกัด / บริษัท ชีคอต จำกัด.....

ตั้งอยู่ที่เลขที่ 239 หมู่ที่ 1 ต.พรหม/ซอย 1.....

ถนน ร่มเกล้าฯ..... ตำบล/แขวง บางซื่อ.....

อำเภอ/เขต บางซื่อ..... จังหวัด กรุงเทพฯ..... รหัสไปรษณีย์ 10800.....

โทรศัพท์ 02-8593600..... โทรสาร 02-8593535.....

ได้รับทราบระเบียบกรมโรงงานอุตสาหกรรมว่าด้วยการขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน พ.ศ. 2560 โดยตลอดแล้วและยินยอมปฏิบัติตามระเบียบฯทุกประการ และได้แนบบเอกสารต่างๆ ตามรายการเอกสารประกอบการพิจารณา (แบบ ปอ.1-1) มาพร้อมนี้

รายการขอดำเนินการ

การดำเนินการ	รายละเอียด (รายการ)				
	น้ำเสีย/น้ำทิ้ง	น้ำใต้ดิน	อากาศเสีย	สิ่งปฏิกูลหรือวัสดุที่ไม่ใช้แล้ว	ดิน
[] ขอขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน					
[/] ต่ออายุห้องปฏิบัติการวิเคราะห์เอกชน	46	123	27	34	122
[] เปลี่ยนแปลงสารมลพิษที่วิเคราะห์ (/) เพิ่มสารมลพิษ () ยกเลิกสารมลพิษ		2	1		2
[] เปลี่ยนแปลงบุคลากร (/) เพิ่มบุคลากร () ยกเลิกบุคลากร	จำนวน 16.....ราย (รายละเอียดตาม แบบ ปว.1) จำนวน.....ราย (รายละเอียดตาม แบบ ปว.1-1)				
[] ยกเลิกห้องปฏิบัติการวิเคราะห์เอกชน					
[] อื่นๆ ..โปรดระบุ.....					

จึงเรียนมาเพื่อโปรดพิจารณา

นายสมชาย ใจดี

ผู้มีอำนาจลงนามแทนนิติบุคคล

วันที่ 7 เม.ย. 66

เวลา 14.05

ผู้จัดทำ

F-ED-LR-01-1/11

ลงชื่อ.....

(นายสมชาย ใจดี)

ผู้มีอำนาจลงนามแทนนิติบุคคล

ประทับตรา (ตัว)





ที่ อก ๐๓๑๐(๑)/ ๑๗๔ ๕

กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท
เขตราชเทวี กรุงเทพฯ ๑๐๔๐๐

๐๕ กุมภาพันธ์ ๒๕๖๕

เรื่อง เปลี่ยนแปลงบุคลากรของห้องปฏิบัติการวิเคราะห์

เรียน กรรมการผู้จัดการ บริษัท ซีคอฟ จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกชน
ลงวันที่ ๒๘ มกราคม ๒๕๖๕

ตามหนังสือที่อ้างถึง บริษัท ซีคอฟ จำกัด ห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ๖-๒๓๙
สถานที่ตั้งเลขที่ ๒๓๙ ถนนริมคลองประปา แขวงบางซื่อ เขตบางซื่อ กรุงเทพมหานคร ขอเปลี่ยนแปลง
บุคลากรของห้องปฏิบัติการวิเคราะห์ ความละเอียดแจ้งแล้ว นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว มีความเห็นดังนี้

๑. ให้ยกเลิกเจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๔ ราย

- | | |
|-------------------------------------|----------------------------|
| ๑) นางสาวโชติมาส ไทยเจริญ | ทะเบียนเลขที่ ๖-๒๓๙-จ-๖๐๐๖ |
| ๒) นางสาวณัฐศิริ เลิศธีรพัฒน์ | ทะเบียนเลขที่ ๖-๒๓๙-จ-๖๔๒๓ |
| ๓) นางสาวเกศวรินทร์ ศิลศึก | ทะเบียนเลขที่ ๖-๒๓๙-จ-๖๔๒๔ |
| ๔) นางสาวจิรนนท์ จิตตะศรี ปิยะธนากร | ทะเบียนเลขที่ ๖-๒๓๙-จ-๗๒๓๒ |

๒. ให้เพิ่มผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์ จำนวน ๑ ราย

- | | |
|----------------------------|----------------------------|
| นางสาวณัฐศิริ เลิศธีรพัฒน์ | ทะเบียนเลขที่ ๖-๒๓๙-ค-๐๐๐๑ |
|----------------------------|----------------------------|

๓. ให้เพิ่มเจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๒ ราย

- | | |
|--------------------------------------|----------------------------|
| ๑) นางสาวสุศุภาพร สุนทร | ทะเบียนเลขที่ ๖-๒๓๙-จ-๐๐๐๑ |
| ๒) นางสาวณัฐณัฐลักษณ์ อินทรประสิทธิ์ | ทะเบียนเลขที่ ๖-๒๓๙-จ-๐๐๐๒ |

อนึ่ง หนังสือฉบับนี้จะหมดอายุพร้อมหนังสือต่ออายุรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน
ที่ อก ๐๓๑๐(๑)/๑๑๘๐๔ ลงวันที่ ๒๑ ตุลาคม ๒๕๖๓ คือในวันที่ ๒ พฤษภาคม ๒๕๖๖ ทั้งนี้ สามารถยื่นคำ
ขอผ่านระบบอิเล็กทรอนิกส์ได้ที่หน้าเว็บไซต์กรมโรงงานอุตสาหกรรม ตาม QR Code ท้ายหนังสือฉบับนี้

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

(นางจินดา เดชะศรีนทร์)

ผู้อำนวยการกองวิจัยและเตือนภัยมลพิษโรงงาน
ปฏิบัติการตามแผนปฏิบัติการกรมโรงงานอุตสาหกรรม



ยื่นคำขอผ่านระบบอิเล็กทรอนิกส์

กองวิจัยและเตือนภัยมลพิษโรงงาน

กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษและทะเบียนห้องปฏิบัติการ

โทร. ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๐๓-๕

โทรสาร ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๙๔

ไปรษณีย์อิเล็กทรอนิกส์ saraban@diw.mail.go.th



ที่ อก ๐๓๑๐(๑)/ ๑๑ ๘ ๐ ๕

กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ เขตราชเทวี
กรุงเทพมหานคร ๑๐๔๐๐

๒๑ ตุลาคม ๒๕๖๓

เรื่อง ต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

เรียน กรรมการผู้จัดการ บริษัท ซีคอฟ จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกชน
ลงวันที่ ๒๔ มีนาคม ๒๕๖๓

สิ่งที่ส่งมาด้วย ๑. รายชื่อผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์ จำนวน ๑ แผ่น

๒. รายชื่อเจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๑ แผ่น

๓. ขอบข่ายสารมลพิษที่ได้รับขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๓๒ แผ่น

ตามหนังสือที่อ้างถึง บริษัท ซีคอฟ จำกัด ขอต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการ
วิเคราะห์เอกชน เลขทะเบียน ๖-๒๓๙ สถานที่ตั้งเลขที่ ๒๓๙ ถนนริมคลองประปา แขวงบางซื่อ เขตบางซื่อ
กรุงเทพมหานคร ต่อกรมโรงงานอุตสาหกรรม นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้บริษัท ซีคอฟ จำกัด ต่ออายุหนังสือรับขึ้นทะเบียน
ห้องปฏิบัติการวิเคราะห์เอกชน โดยมีองค์ประกอบดังนี้

ก. ผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์ จำนวน ๑๐ ราย ตามสิ่งที่ส่งมาด้วย ๑

ข. เจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๓๑ ราย ตามสิ่งที่ส่งมาด้วย ๒

ค. ขอบข่ายสารมลพิษที่ได้รับขึ้นทะเบียนไว้วิเคราะห์ในน้ำเสีย จำนวน ๔๖ รายการ น้ำได้ดิน
จำนวน ๑๒๓ รายการ อากาศเสีย จำนวน ๒๗ รายการ สิ่งปฏิกูลหรือวัสดุที่ไม่ใช้แล้ว จำนวน ๓๔ รายการ
และดิน จำนวน ๑๒๒ รายการ รวมทั้งสิ้นจำนวน ๓๕๒ รายการ ตามสิ่งที่ส่งมาด้วย ๓

หนังสือฉบับนี้จะหมดอายุในวันที่ ๒ พฤษภาคม ๒๕๖๖ หากประสงค์จะต่ออายุหนังสือ
รับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน ให้ยื่นคำขอต่ออายุพร้อมเอกสารประกอบคำขอต่อ
กรมโรงงานอุตสาหกรรมภายใน ๓๐ วัน ก่อนวันสิ้นอายุของหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน
ซึ่งคำขอต่ออายุดังกล่าวขอรับได้ที่กรมโรงงานอุตสาหกรรม

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

(นางจินดา เดชะศรีนทร์)

ผู้อำนวยการกองวิจัยและเตือนภัยมลพิษโรงงาน
ปฏิบัติการตามแผนปฏิบัติการกรมโรงงานอุตสาหกรรม

กองวิจัยและเตือนภัยมลพิษโรงงาน

กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษและทะเบียนห้องปฏิบัติการ

โทร. ๐ ๒๒๐๒ ๔๐๐๒ ๐ ๒๒๐๒ ๔๑๔๖

โทรสาร ๐ ๒๓๕๔ ๓๒๐๘ ๐ ๒๓๕๔ ๓๔๑๕

เอกสารแนบท้ายหนังสือรับต่ออายุขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

บริษัท ซีคोट จำกัด

เลขทะเบียน ว-๒๓๙

ที่ อก ๐๓๑๐(๑)/ ๑๑ ๘ ๐ ๔

ลงวันที่ ๒๑ ตุลาคม ๒๕๖๓

ก. ผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์ จำนวน ๑๐ ราย

๑) นางสาวฤดี เกรียงไกรอุดม	ทะเบียนเลขที่ ว-๒๓๙-ค-๕๕๒๐
๒) นางอารยา ทิพรักษ์	ทะเบียนเลขที่ ว-๒๓๙-ค-๕๕๖๓
๓) นายขรรชัย เกรียงไกรอุดม	ทะเบียนเลขที่ ว-๒๓๙-ค-๕๕๗๕
๔) นางสาวชมชุตตา อินทร์ศร	ทะเบียนเลขที่ ว-๒๓๙-ค-๕๕๗๖
๕) นางสาวปรีดา สมใจ	ทะเบียนเลขที่ ว-๒๓๙-ค-๕๕๗๘
๖) นางสาวอริญญา มาตา	ทะเบียนเลขที่ ว-๒๓๙-ค-๕๕๗๙
๗) นางสาวลดาวัลย์ วงศ์เจริญ	ทะเบียนเลขที่ ว-๒๓๙-ค-๕๕๘๐
๘) นางสาวมณีวรรณ เกตวันดี	ทะเบียนเลขที่ ว-๒๓๙-ค-๕๕๘๒
๙) นางสาวนริสา ภูวสรเพ็ชญ์	ทะเบียนเลขที่ ว-๒๓๙-ค-๖๔๑๙
๑๐) นางสาวศิริวรรณ อิมสง่า	ทะเบียนเลขที่ ว-๒๓๙-ค-๖๔๒๐

เอกสารแนบท้ายหนังสือรับต่ออายุขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

บริษัท ซีคोट จำกัด

เลขทะเบียน ว-๒๓๙

ที่ อก ๐๓๑๐(๑)/ ๑๑ ๘ ๐ ๔

ลงวันที่ ๒๑ ตุลาคม ๒๕๖๓

ข. เจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๓๑ ราย

๑) นางสาวสุรัชวี ชัยธรรม	ทะเบียนเลขที่ ว-๒๓๙-จ-๕๕๒๕
๒) นางสาวสุธาทิพย์ เทียนเตี้ย	ทะเบียนเลขที่ ว-๒๓๙-จ-๕๕๒๙
๓) นางสาวสุนันทา ศิริคุณานนท์	ทะเบียนเลขที่ ว-๒๓๙-จ-๕๕๘๓
๔) นายบวร ศิขัยยะ	ทะเบียนเลขที่ ว-๒๓๙-จ-๕๕๘๖
๕) นางสาวเกศรินทร์ วรเดชาวิทยา	ทะเบียนเลขที่ ว-๒๓๙-จ-๕๕๙๑
๖) นายอนันต์พนธ์ พิมวันนา	ทะเบียนเลขที่ ว-๒๓๙-จ-๖๐๐๑
๗) นายชิตพล สมประสงค์	ทะเบียนเลขที่ ว-๒๓๙-จ-๖๐๐๒
๘) นางสาวศศิธร พรหมประเสริฐ	ทะเบียนเลขที่ ว-๒๓๙-จ-๖๐๐๓
๙) นายศิวนนท์ กลวงษ์	ทะเบียนเลขที่ ว-๒๓๙-จ-๖๐๐๕
๑๐) นางสาวโชติมาส ไทยเจริญ	ทะเบียนเลขที่ ว-๒๓๙-จ-๖๐๐๖
๑๑) นางสาวปิยขวัญ สุระโคตร	ทะเบียนเลขที่ ว-๒๓๙-จ-๖๔๒๑
๑๒) นางสาวณัฐศิริ เลิศธีรพิพัฒน์	ทะเบียนเลขที่ ว-๒๓๙-จ-๖๔๒๓
๑๓) นางสาวเกษวรินทร์ ศิลศึก	ทะเบียนเลขที่ ว-๒๓๙-จ-๖๔๒๔
๑๔) นางสาวอลิษา คณิวรรณท์	ทะเบียนเลขที่ ว-๒๓๙-จ-๗๒๓๑
๑๕) นางสาวจิรนนท์ จิตตะศรี ปิยะธนากร	ทะเบียนเลขที่ ว-๒๓๙-จ-๗๒๓๒
๑๖) นางสาวสิริวรรณ แก้วชิงดวง	ทะเบียนเลขที่ ว-๒๓๙-จ-๗๒๓๓
๑๗) นางสาวปัทมวรรณ สุวรรณวิโรจน์	ทะเบียนเลขที่ ว-๒๓๙-จ-๗๒๓๔
๑๘) นางสาวกนิษฐา เจริญเชื้อ	ทะเบียนเลขที่ ว-๒๓๙-จ-๗๒๓๖
๑๙) นายจิรากร ล้อมศิลา	ทะเบียนเลขที่ ว-๒๓๙-จ-๗๒๓๗
๒๐) นายชนาธิป สิงห์เกษมศักดิ์	ทะเบียนเลขที่ ว-๒๓๙-จ-๗๒๓๘
๒๑) นายวัชรกานต์ ประมาคะเต	ทะเบียนเลขที่ ว-๒๓๙-จ-๗๒๔๐
๒๒) นายชอง เสงฆ์กุล	ทะเบียนเลขที่ ว-๒๓๙-จ-๗๒๔๒
๒๓) นางสาวกฤษณา จันทุม	ทะเบียนเลขที่ ว-๒๓๙-จ-๗๘๐๒
๒๔) นางสาวพรนภา บุตรธรรม	ทะเบียนเลขที่ ว-๒๓๙-จ-๗๘๐๓
๒๕) นางสาวธาริณี อาจปลิว	ทะเบียนเลขที่ ว-๒๓๙-จ-๗๘๐๔
๒๖) นายธนโชติ ช่างล้อ	ทะเบียนเลขที่ ว-๒๓๙-จ-๗๘๐๖
๒๗) นางสาวพัชรา สมานพันธ์	ทะเบียนเลขที่ ว-๒๓๙-จ-๘๑๓๓
๒๘) นางสาวจุฑารัตน์ แจ่มเรือน	ทะเบียนเลขที่ ว-๒๓๙-จ-๘๔๔๓
๒๙) นางสาวจณิสตา กุ้ยอ่อน	ทะเบียนเลขที่ ว-๒๓๙-จ-๘๕๓๗
๓๐) นางสาววรัญญา เขียนม้น	ทะเบียนเลขที่ ว-๒๓๙-จ-๘๕๓๘
๓๑) นางสาวจิรารัตน์ นุริตมนต์	ทะเบียนเลขที่ ว-๒๓๙-จ-๘๕๓๙

เอกสารแนบท้ายหนังสือรับต่ออายุขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

บริษัท ซีคอฟ จำกัด

เลขทะเบียน ว-๒๓๙

ที่ อก ๐๓๑๐(๑)/ ๑๑ ๘ ๐ ๔

ลงวันที่ ๒๑ ตุลาคม ๒๕๖๓

ขอขยายสารมลพิษที่ได้รับขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๓๕๒ รายการ

น้ำเสีย จำนวน 46 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Aldrin	1) Liquid-Liquid Extraction, Gas Chromatographic Method ^[4] 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[4]
2	Arsenic	1) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^[4] 2) Digestion, Inductively Coupled Plasma Method ^[4]
3	Barium	1) Digestion, Direct Nitrous Oxide-Acetylene Flame Method ^[4] 2) Digestion, Inductively Coupled Plasma Method ^[4]
4	α-BHC	1) Liquid-Liquid Extraction, Gas Chromatographic Method ^[4] 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[4]
5	β-BHC	1) Liquid-Liquid Extraction, Gas Chromatographic Method ^[4] 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[4]
6	γ-BHC	1) Liquid-Liquid Extraction, Gas Chromatographic Method ^[4] 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[4]
7	δ-BHC	1) Liquid-Liquid Extraction, Gas Chromatographic Method ^[4] 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[4]
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]



(นางริกาญจน์ จิตรสกุลไฉ)

ผู้อำนวยการกลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษ

และทะเบียนห้องปฏิบัติการ

10 Chemical...

-๒-

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
10	Chemical Oxygen Demand	1) Open Reflux, Titrimetric method ^[4] 2) Close 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	2,4-D	Liquid-Liquid Extraction, Gas Chromatographic Method ^[4]
17	4,4'-DDD	1) Liquid-Liquid Extraction, Gas Chromatographic Method ^[4] 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[4]
18	4,4'-DDE	1) Liquid-Liquid Extraction, Gas Chromatographic Method ^[4] 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[4]
19	4,4'-DDT	1) Liquid-Liquid Extraction, Gas Chromatographic Method ^[4] 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[4]
20	Dieldrin	1) Liquid-Liquid Extraction, Gas Chromatographic Method ^[4] 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[4]



(นางริกาญจน์ จิตรสกุลไฉ)

ผู้อำนวยการกลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษ

และทะเบียนห้องปฏิบัติการ

21 Endosulfan I...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
21	Endosulfan I	1) Liquid-Liquid Extraction, Gas Chromatographic Method ^[4] 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[4]
22	Endosulfan II	1) Liquid-Liquid Extraction, Gas Chromatographic Method ^[4] 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[4]
23	Endosulfan Sulfate	1) Liquid-Liquid Extraction, Gas Chromatographic Method ^[4] 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[4]
24	Endrin	1) Liquid-Liquid Extraction, Gas Chromatographic Method ^[4] 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[4]
25	Endrin Aldehyde	1) Liquid-Liquid Extraction, Gas Chromatographic Method ^[4] 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[4]
26	Formaldehyde	Distillation, Colorimetric Method ^[3]
27	Free Chlorine	1) Iodometric Method ^[4] 2) DPD Colorimetric Method ^[4]
28	Heptachlor	1) Liquid-Liquid Extraction, Gas Chromatographic Method ^[4] 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[4]
29	Heptachlor epoxide	1) Liquid-Liquid Extraction, Gas Chromatographic Method ^[4] 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[4]
30	Hexavalent Chromium	1) Colorimetric Method ^[4] 2) Extraction, Air-Acetylene Flame Method ^[4]
31	Lead	1) Digestion, Direct Air-Acetylene Flame Method ^[4] 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method ^[4] 3) Digestion, Inductively Coupled Plasma Method ^[4]

วิภา

(นางริกาญจน์ ฉัตรสกุลวิไล)

32 Manganese...

ผู้อำนวยการกลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
32	Manganese	1) Digestion, Direct Air-Acetylene Flame Method ^[4] 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method ^[4] 3) Digestion, Inductively Coupled Plasma Method ^[4]
33	Mercury	Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ^[4]
34	Methoxychlor	Liquid-Liquid Extraction, Gas Chromatographic Method ^[4]
35	Nickel	1) Digestion, Direct Air-Acetylene Flame Method ^[4] 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method ^[4] 3) Digestion, Inductively Coupled Plasma Method ^[4]
36	Oil & Grease	1) Liquid-Liquid, Partition-Gravimetric Method ^[4] 2) Soxhlet Extraction Method ^[4]
37	pH	Electrometric Method ^[4]
38	Phenols	1) Distillation, Chloroform Extraction Method ^[4] 2) Distillation, Direct Photometric Method ^[4]
39	Selenium	1) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^[4] 2) Digestion, Inductively Coupled Plasma Method ^[4]
40	Sulfide	1) Iodometric method ^[4] 2) Methylene blue method ^[4]
41	Temperature	Laboratory and Field Methods ^[4]
42	Total Dissolved Solids	Dried at 180 °C ^[4]
43	Total Kjeldahl Nitrogen	1) Macro Kjeldahl Method ^[4] 2) Semi-Micro Kjeldahl Method ^[4]
44	Total Suspended Solids	Dried at 103-105 °C ^[4]
45	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]
46	Zinc	1) Digestion, Direct Air-Acetylene Flame Method ^[4] 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method ^[4] 3) Digestion, Inductively Coupled Plasma Method ^[4]

วิภา

(นางริกาญจน์ ฉัตรสกุลวิไล)

น้ำใต้ดิน...

ผู้อำนวยการกลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษ

น้ำใต้ดิน จำนวน 123 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]
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]

วิทย์

16 Beryllium...

(นางริกาญจน์ ถักรสกุลวิไล)

ผู้อำนวยการกลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
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]
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]

วิทย์

32 2-Chlorophenol...

(นางริกาญจน์ ถักรสกุลวิไล)

ผู้อำนวยการกลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
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]
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]

วิทย์

42 Diben(a,h)...

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ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
42	Diben(a,h)anthracene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
43	Di-n-butyl phthalate	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
44	1,2-Dichlorobenzene	Purge and Trap Gas Chromatographic/ Mass spectrometric Method ^[4]
45	1,3-Dichlorobenzene	Purge and Trap Gas Chromatographic/ Mass spectrometric Method ^[4]
46	1,4-Dichlorobenzene	Purge and Trap Gas Chromatographic/ Mass spectrometric Method ^[4]
47	3,3'-Dichlorobenzidine	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
48	1,1-Dichloroethane	Purge and Trap Gas Chromatographic/ Mass spectrometric Method ^[4]
49	1,2-Dichloroethane	Purge and Trap Gas Chromatographic/ Mass spectrometric Method ^[4]
50	1,1-Dichloroethylene	Purge and Trap Gas Chromatographic/ Mass spectrometric Method ^[4]
51	cis-1,2-Dichloroethylene	Purge and Trap Gas Chromatographic/ Mass spectrometric Method ^[4]
52	trans-1,2-Dichloroethylene	Purge and Trap Gas Chromatographic/ Mass spectrometric Method ^[4]
53	2,4-Dichlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
54	1,2-Dichloropropane	Purge and Trap Gas Chromatographic/ Mass spectrometric Method ^[4]
55	1,3-Dichloropropane	Purge and Trap Gas Chromatographic/ Mass spectrometric Method ^[4]
56	1,3-Dichloropropene	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]

วิทย์

59 2,4-Dimethylphenol...

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ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
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 Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
65	Endrin	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	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]

73 n-Hexane...

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ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
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 Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
76	γ -HCH	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...

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ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
85	Methoxychlor	Liquid-Liquid Extraction, Gas Chromatographic Method ^[4]
86	Methyl bromide	Purge and Trap Gas Chromatographic/ Mass spectrometric Method ^[4]
87	Methylene chloride	Purge and Trap Gas Chromatographic/ Mass spectrometric Method ^[4]
88	2-Methylphenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
89	2-Methylnaphthalene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
90	Methyl tert-butyl ether	Purge and Trap Gas Chromatographic/ Mass spectrometric Method ^[4]
91	Naphthalene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
92	Nickel	1) Digestion, 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	Polychlorinated Biphenyls - PCB-1016 - PCB-1221 - PCB-1232 - PCB-1242 - PCB-1248 - PCB-1254 - PCB-1260	Liquid-Liquid Extraction, Gas Chromatographic Method ^[4]
96	Pentachlorophenol	1) Liquid-Liquid Extraction, Gas Chromatographic Method ^[4] 2) Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]


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97 pH...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
97	pH	Electrometric method ^[4]
98	Phenanthrene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
99	Phenol	1) Distillation, Chloroform Extraction Method ^[4] 2) Distillation, Direct Photometric Method ^[4] 3) Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
100	Pyrene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
101	Selenium	1) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^[4] 2) Digestion, Inductively Coupled Plasma Method ^[4]
102	Silver	1) Digestion, Direct Air-Acetylene Flame Method ^[4] 2) Digestion, Inductively Coupled Plasma Method ^[4]
103	Styrene	Purge and Trap Gas Chromatographic/ Mass spectrometric Method ^[4]
104	1,1,2,2-Tetrachloroethane	Purge and Trap Gas Chromatographic/ Mass spectrometric Method ^[4]
105	Tetrachloroethylene	Purge and Trap Gas Chromatographic/ Mass spectrometric Method ^[4]
106	Toluene	Purge and Trap Gas Chromatographic/ Mass spectrometric Method ^[4]
107	TPH (C ₅ -C ₈)	Purge and Trap, Gas Chromatographic/ Mass spectrometric Method ^[7,9]
108	TPH (C ₈ -C ₁₆)	1) Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^[6,8] 2) Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass spectrometric Method ^[6,9]
109	TPH (C ₁₆ -C ₃₅)	1) Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^[6,8] 2) Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass spectrometric Method ^[6,9]
110	1,2,4-Trichlorobenzene	Purge and Trap Gas Chromatographic/ Mass spectrometric Method ^[4]
111	1,1,1-Trichloroethane	Purge and Trap Gas Chromatographic/ Mass spectrometric Method ^[4]


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112 1,1,2-Trichloroethane...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
112	1,1,2-Trichloroethane	Purge and Trap Gas Chromatographic/ Mass spectrometric Method ^[4]
113	Trichloroethylene	Purge and Trap Gas Chromatographic/ Mass spectrometric Method ^[4]
114	2,4,5-Trichlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
115	2,4,6-Trichlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
116	1,3,5-Trimethylbenzene	Purge and Trap Gas Chromatographic/ Mass spectrometric Method ^[4]
117	Vanadium	Digestion, Inductively Coupled Plasma Spectrometric Method ^[4]
118	Vinyl chloride	Purge and Trap Gas Chromatographic/ Mass spectrometric Method ^[4]
119	m-Xylene	Purge and Trap Gas Chromatographic/ Mass spectrometric Method ^[4]
120	o-Xylene	Purge and Trap Gas Chromatographic/ Mass spectrometric Method ^[4]
121	p-Xylene	Purge and Trap Gas Chromatographic/ Mass spectrometric Method ^[4]
122	Xylene (Total)	Purge and Trap Gas Chromatographic/ Mass spectrometric Method ^[4]
123	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]

วิมล

(นางริกาญจน์ ฉัตรสุภาวดี)

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2 Arsenic...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
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]
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, Analysis by ISO/IEC 17025 Accredited Laboratory or Analysis by Department of Industrial Works Registered Laboratory (Dioxins/Furans Analysis Approved) ^[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]

วิมล

(นางริกาญจน์ ฉัตรสุภาวดี)

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14 Hydrogen Sulfide...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
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]
19	Opacity	Ringelmann's Method ^[2]
20	Oxide of Nitrogen	1) Absorption Sampling, Ion Chromatographic Method ^[5] 2) Absorption Sampling, Phenoldisulfonic acid 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) 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	Isokinetic Sampling, Gravimetric Method ^[5]


26 Vanadium...


(นางริกาญจน์ ฉัตรสกุลวิไล)
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ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
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]

สิ่งปฏิกูลหรือวัสดุที่ไม่ใช้แล้ว จำนวน 34 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Aldrin	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 ^[1,9,26] 3) Soxhlet Extraction, Gas Chromatographic Method ^[10,22] 4) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[10,26]
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, Digestion, Inductively Coupled Plasma Method ^[1,6,14]


(นางริกาญจน์ ฉัตรสกุลวิไล)
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3) Digestion...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
5	Beryllium	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 ^[1,9,26] 3) Soxhlet Extraction, Gas Chromatographic Method ^[10,22] 4) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[10,26]
9	Chromium (III)	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]
		1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method; Waste Extraction, Colorimetric Method; Calculation Method ^[1,6,15,17] 2) Waste Extraction, Digestion, Inductively Coupled Plasma Method; Waste Extraction, Colorimetric Method; Calculation Method ^[1,6,16,17]



(นางริกาญจน์ จิตรสกุลไธ)

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3) Digestion...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
10	Chromium (VI)	3) Digestion, Flame Atomic Absorption Spectrometric Method; Alkaline Digestion, Colorimetric Method; Calculation Method ^[7,8,15,17] 4) Digestion, Inductively Coupled Plasma Method; Alkaline Digestion, Colorimetric Method; Calculation Method ^[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]
13	2,4-D	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]
14	DDD	1) Waste Extraction, Gas Chromatographic/Mass Spectrometric Method ^[1,24] 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^[24]
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 ^[1,9,26] 3) Soxhlet Extraction, Gas Chromatographic Method ^[10,22] 4) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[10,26]
		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 ^[1,9,26]



(นางริกาญจน์ จิตรสกุลไธ)

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3) Soxhlet...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
16	DDT	3) Soxhlet Extraction, Gas Chromatographic Method ^[10,22] 4) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[10,26] 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 ^[1,9,26] 3) Soxhlet Extraction, Gas Chromatographic Method ^[10,22] 4) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[10,26]
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 ^[1,9,26] 3) Soxhlet Extraction, Gas Chromatographic Method ^[10,22] 4) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[10,26]
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 ^[1,9,26] 3) Soxhlet Extraction, Gas Chromatographic Method ^[10,22] 4) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[10,26]
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 ^[1,9,26] 3) Soxhlet Extraction, Gas Chromatographic Method ^[10,22] 4) Soxhlet...

4) Soxhlet...

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ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
20	Lead	4) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[10,26] 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]
21	Lindane	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 ^[1,9,26] 3) Soxhlet Extraction, Gas Chromatographic Method ^[10,22] 4) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[10,26]
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 ^[1,9,26] 3) Soxhlet Extraction, Gas Chromatographic Method ^[10,22] 4) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[10,26]
24	Molybdenum	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,6,14] 2) Digestion, Inductively Coupled Plasma Method ^[7,14]

25 Nickel...

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ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
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 ^[1,24] 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^[24]
28	pH	Electrometric Method ^[30,31]
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, Inductively Coupled Plasma Method ^[7,14]
30	Silver	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 ^[1,12,25] 2) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[12,25]

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33 Vanadium...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
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 ^[10,26]
2	Acetone	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[13,25]
3	Aldrin	1) Ultrasonic Extraction, Gas Chromatographic Method ^[11,22] 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^[11,26]
4	Anthracene	Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[10,26]
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 ^[11,22]
8	Barium	1) Digestion, Flame Atomic Absorption Spectrometric Method ^[7,15] 2) Digestion, Inductively Coupled Plasma Method ^[7,14]

9 Benz(a)anthracene...

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และทะเบียนห้องปฏิบัติการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
9	Benz(a)anthracene	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[10,26]
10	Benzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[13,25]
11	Benzo(b)fluoranthene	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[10,26]
12	Benzo(k)fluoranthene	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[10,26]
13	Benzoic acid	Ultrasonic Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[11,26]
14	Benzo(a)pyrene	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[10,26]
15	Benzo(g,h,i)perylene	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[10,26]
16	Beryllium	Digestion, Inductively Coupled Plasma Method ^[7,14]
17	Bis(2-chloroethyl)ether	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[10,26]
18	Bis(2-ethylhexyl)phthalate	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[10,26]
19	Bromodichloromethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[13,25]
20	Bromoform	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[13,25]
21	Butanol	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[13,25]
22	Butyl benzyl phthalate	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[10,26]
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 ^[10,26]
25	Carbon disulfide	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[13,25]
26	Carbon tetrachloride	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[13,25]

27 Chlordane...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
27	Chlordane	1) Ultrasonic Extraction, Gas Chromatographic Method ^[11,22] 2) Ultrasonic Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[11,26]
28	p-Chloroaniline	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[10,26]
29	Chlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[13,25]
30	Chlorodibromomethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[13,25]
31	Chloroform	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[13,25]
32	2-Chlorophenol	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[10,26]
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 Method ^[7,8,15,17] 2) Digestion, Inductively Coupled Plasma Method; Colorimetric Method; Calculation Method ^[7,8,14,17]
35	Chromium (VI)	Alkaline Digestion, Colorimetric Method ^[8,17]
36	Chrysene	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[10,26]
37	Cyanide	1) Extraction, Distillation, Titrimetric Method ^[27,28,29] 2) Extraction, Distillation, Colorimetric Method ^[27,28,29]
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 ^[11,26]
40	DDE	1) Ultrasonic Extraction, Gas Chromatographic Method ^[11,22] 2) Ultrasonic Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[11,26]

41 DDT...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
41	DDT	1) Ultrasonic Extraction, Gas Chromatographic Method ^(11,22) 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(11,26)
42	Dibenz(a,h)anthracene	Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26)
43	Di-n-butyl phthalate	Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26)
44	1,2-Dichlorobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13,25)
45	1,3-Dichlorobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13,25)
46	1,4-Dichlorobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13,25)
47	3,3'-Dichlorobenzidine	Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26)
48	1,1-Dichloroethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13,25)
49	1,2-Dichloroethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13,25)
50	1,1-Dichloroethylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13,25)
51	cis-1,2-Dichloroethylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13,25)
52	trans-1,2-Dichloroethylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13,25)
53	2,4-Dichlorophenol	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(11,26)
54	1,2-Dichloropropane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13,25)
55	1,3-Dichloropropane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13,25)
56	1,3-Dichloropropene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13,25)



(นางริกาญจน์ จิตตรสกุลไธ)

ผู้อำนวยการศูนย์มาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษ

และทะเบียนห้องปฏิบัติการ

57 Dieldrin...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
57	Dieldrin	1) Ultrasonic Extraction, Gas Chromatographic Method ^(11,22) 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(11,26)
58	Diethyl phthalate	Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26)
59	2,4-Dimethylphenol	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(11,26)
60	2,4-Dinitrophenol	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(11,26)
61	2,4-Dinitrotoluene	Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26)
62	2,6-Dinitrotoluene	Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26)
63	Di-n-Octyl phthalate	Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26)
64	Endosulfan	1) Ultrasonic Extraction, Gas Chromatographic Method ^(11,22) 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(11,26)
65	Endrin	1) Ultrasonic Extraction, Gas Chromatographic Method ^(11,22) 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(11,26)
66	Ethylbenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13,25)
67	Fluoranthene	Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26)
68	Fluorene	Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26)
69	Heptachlor	1) Ultrasonic Extraction, Gas Chromatographic Method ^(11,22) 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(11,26)



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และทะเบียนห้องปฏิบัติการ

70 Heptachlor epoxide...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
70	Heptachlor epoxide	1) Ultrasonic Extraction, Gas Chromatographic Method ^[11,22] 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^[11,26]
71	Hexachlorobenzene	Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[10,26]
72	Hexachloro-1,3-butadiene	Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[10,26]
73	n-Hexane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[13,25]
74	α -HCH	1) Ultrasonic Extraction, Gas Chromatographic Method ^[11,22] 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^[11,26]
75	β -HCH	1) Ultrasonic Extraction, Gas Chromatographic Method ^[11,22] 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^[11,26]
76	γ -HCH	1) Ultrasonic Extraction, Gas Chromatographic Method ^[11,22] 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^[11,26]
77	Hexachlorocyclopentadiene	Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[10,26]
78	Hexachloroethane	Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[10,26]
79	Indeno(1,2,3-cd)pyrene	Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[10,26]
80	Isophorone	Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[10,26]
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...

(นางริกาญจน์ นิตกรสุวิไล)

ผู้อำนวยการกลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษ

และหน่วยงานที่เกี่ยวข้องในการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
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 ^[11,26]
86	Methyl bromide	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[13,25]
87	Methylene chloride	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[13,25]
88	2-Methylphenol	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^[11,26]
89	2-Methylnaphthalene	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^[11,26]
90	Methyl tert-butyl ether	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[13,25]
91	Naphthalene	Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[10,26]
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 ^[10,26]
94	N-Nitrosodiphenylamine	Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[10,26]
95	Polychlorinated Biphenyls - Aroclor 1016 - Aroclor 1221 - Aroclor 1232 - Aroclor 1242 - Aroclor 1248 - Aroclor 1254 - Aroclor 1260	Soxhlet Extraction, Gas Chromatographic Method ^[10,23]



96 Pentachlorophenol...

(นางริกาญจน์ นิตกรสุวิไล)

ผู้อำนวยการกลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษ

และหน่วยงานที่เกี่ยวข้องในการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
96	Pentachlorophenol	Ultrasonic Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[24]
97	Phenanthrene	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[10,26]
98	Phenol	Ultrasonic Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[11,26]
99	Pyrene	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[10,26]
100	Selenium	1) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^[7,20] 2) Digestion, Inductively Coupled Plasma Method ^[7,14]
101	Silver	1) Digestion, Flame Atomic Absorption Spectrometric Method ^[7,15] 2) Digestion, Inductively Coupled Plasma Method ^[7,14]
102	Styrene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[13,25]
103	1,1,2,2-Tetrachloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[13,25]
104	Tetrachloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[13,25]
105	Toluene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[13,25]
106	TPH (C ₅ -C ₈)	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[13,25]
107	TPH (C ₈ -C ₁₆)	1) Soxhlet Extraction, Gas Chromatographic Method ^[10,21] 2) Soxhlet Extraction, Gas Chromatographic/ Mass spectrometric Method ^[10,21]
108	TPH (C ₁₆ -C ₃₅)	1) Soxhlet Extraction, Gas Chromatographic Method ^[10,21] 2) Soxhlet Extraction, Gas Chromatographic/ Mass spectrometric Method ^[10,25]
109	1,2,4-Trichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[13,25]
110	1,1,1-Trichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[13,25]



(นางริกาญจน์ จัตรสกุลไชย)

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111 1,1,2-Trichloroethane...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
111	1,1,2-Trichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[13,25]
112	Trichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[13,25]
113	2,4,5-Trichlorophenol	Ultrasonic Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[11,26]
114	2,4,6-Trichlorophenol	Ultrasonic Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[11,26]
115	1,3,5-Trimethylbenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[13,25]
116	Vanadium	Digestion, Inductively Coupled Plasma Method ^[7,14]
117	Vinyl chloride	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[13,25]
118	m-Xylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[13,25]
119	o-Xylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[13,25]
120	p-Xylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[13,25]
121	Xylene (Total)	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[13,25]
122	Zinc	1) Digestion, Flame Atomic Absorption Spectrometric Method ^[7,15] 2) Digestion, Inductively Coupled Plasma Method ^[7,14]

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(นางริกาญจน์ จัตรสกุลไชย)

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(นางริภาญจน์ จันตรสกุลวิไล)

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ผู้อำนวยการกลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษ
และทะเบียนห้องปฏิบัติการ

ภาคผนวก ช

ใบรับรองความสามารถห้องปฏิบัติการและขอบข่ายการรับรอง
ห้องปฏิบัติการทดสอบ ตามมาตรฐาน ISO/IEC 17025
จากสำนักงานมาตรฐานอุตสาหกรรม (สมอ.)



ใบรับรองเลขที่ 20T173/1151

ใบรับรองห้องปฏิบัติการ

อาศัยอำนาจตามความในพระราชบัญญัติการมาตรฐานแห่งชาติ พ.ศ. ๒๕๕๑

เลขาธิการสำนักงานมาตรฐานผลิตภัณฑ์อุตสาหกรรม

ออกใบรับรองฉบับนี้ให้

บริษัท ซีคอฟ จำกัด

มีห้องปฏิบัติการตั้งอยู่เลขที่

239 ถนนริมคลองประปา แขวงบางซื่อ เขตบางซื่อ กรุงเทพมหานคร

ได้รับการรับรองความสามารถห้องปฏิบัติการทดสอบ

ตามมาตรฐานเลขที่ มอก. 17025-2561 (ISO/IEC 17025 : 2017)

ข้อกำหนดทั่วไปว่าด้วยความสามารถห้องปฏิบัติการทดสอบและสอบเทียบ

หมายเลขการรับรองที่ ทดสอบ ๐๓๙๔

โดยมีสาขาการรับรองตามรายละเอียดแนบท้ายใบรับรอง

ตั้งแต่ วันที่ ๙ กันยายน พ.ศ. ๒๕๖๓

ถึง วันที่ ๘ กันยายน พ.ศ. ๒๕๖๖

ออกให้ ณ วันที่ ๒๓ กันยายน ๒๕๖๓

(นายวีระศักดิ์ รื่นทิจอนวัชร)

รองเลขาธิการ ปฏิบัติราชการแทน

เลขาธิการสำนักงานมาตรฐานผลิตภัณฑ์อุตสาหกรรม



กระทรวงอุตสาหกรรม สำนักงานมาตรฐานผลิตภัณฑ์อุตสาหกรรม

รายละเอียดแนบท้ายใบรับรองห้องปฏิบัติการทดสอบ

ใบรับรองเลขที่ 20T173/1151

ชื่อห้องปฏิบัติการ

ที่อยู่

หมายเลขการรับรองที่

สถานภาพห้องปฏิบัติการ

ห้องปฏิบัติการทดสอบ บริษัท ซีคอฟ จำกัด

239 ถนนริมคลองประปา แขวงบางซื่อ เขตบางซื่อ กรุงเทพมหานคร

ทดสอบ 0394

☒ ถาวร ☐ นอกสถานที่ ☐ ชั่วคราว ☐ เคลื่อนที่

สาขาการทดสอบ	รายการทดสอบ	วิธีทดสอบ
สาขาสิ่งแวดล้อม 1. น้ำและน้ำเสีย (water and wastewater)	<ul style="list-style-type: none"> - Arsenic 0.000 5 mg/l to 0.090 0 mg/l - Arsenic 0.05 mg/l to 4.50 mg/l - Barium 0.02 mg/l to 4.50 mg/l - Cadmium 0.01 mg/l to 4.50 mg/l - Chromium 0.01 mg/l to 4.50 mg/l - Copper 0.02 mg/l to 4.50 mg/l - Iron 0.05 mg/l to 9.00 mg/l - Lead 0.03 mg/l to 4.50 mg/l - Manganese 0.01 mg/l to 9.00 mg/l - Nickel 0.01 mg/l to 4.50 mg/l - Zinc 0.02 mg/l to 9.00 mg/l 	<ul style="list-style-type: none"> - Standard Methods for the Examination of Water and Wastewater, APHA, AWWA, WEF, 23rd edition, 2017, Part 3030 F and Part 3114 C - Standard Methods for the Examination of Water and Wastewater, APHA, AWWA, WEF, 23rd edition, 2017, Part 3030 E and Part 3120 B

ฉบับที่ 1 ตั้งแต่ วันที่ 9 กันยายน 2563

หน้า 1/5

กระทรวงอุตสาหกรรม สำนักงานมาตรฐานผลิตภัณฑ์อุตสาหกรรม

รายละเอียดแนบท้ายใบรับรองห้องปฏิบัติการทดสอบ

ใบรับรองเลขที่ 20T173/1151

หมายเลขการรับรองที่ ทดสอบ 0394

สถานภาพห้องปฏิบัติการ ☒ ถาวร ☐ นอกสถานที่ ☐ชั่วคราว ☐เคลื่อนที่

สาขาการทดสอบ	รายการทดสอบ	วิธีทดสอบ
สาขาส่งแวดล้อม		
1. น้ำและน้ำเสีย (ต่อ) (water and wastewater) (cont.)	- COD 100 mg/l to 4 000 mg/l	- Standard Methods for the Examination of Water and Wastewater, APHA, AWWA, WEF, 23 rd edition, 2017, Part 5220 D
2. คุณภาพอากาศ (air quality)		
2.1 บริเวณทำงาน (workplace)	- Total dust 0.10 mg/filter to 2.00 mg/filter - Respirable dust 0.10 mg/filter to 2.00 mg/filter - Benzene 1.10 µg/tube to 420 µg/tube - Toluene 1.10 µg/tube to 420 µg/tube - Total xylenes 2.20 µg/tube to 840 µg/tube • m,p-xylene 1.10 µg/tube to 420 µg/tube • o-xylene 1.10 µg/tube to 420 µg/tube	- NIOSH Manual of Analytical Methods (NMAM), method 0500, 4 th edition, 15 th August 1994 (Exclude Sampling) - NIOSH Manual of Analytical Method(NMAM), method 0600, 4 th edition, 15 th January 1998 (Exclude Sampling) - NIOSH Manual of Analytical Methods (NMAM) , method 1501, 4 th edition, 15 th March 2003 (Exclude Sampling)

รายละเอียดแนบท้ายใบรับรองห้องปฏิบัติการทดสอบ

ใบรับรองเลขที่ 20T173/1151

หมายเลขการรับรองที่ ทดสอบ 0394

สถานภาพห้องปฏิบัติการ ☒ ถาวร ☐ นอกสถานที่ ☐ชั่วคราว ☐เคลื่อนที่

สาขาการทดสอบ	รายการทดสอบ	วิธีทดสอบ
สาขาส่งแวดล้อม		
2. คุณภาพอากาศ (ต่อ) (air quality) (cont.)		
2.2 อากาศในปล่องระบาย อากาศ (stack)	- Sulfur dioxide 1.00 mg/l to 16 000 mg/l (solution)	- US.EPA , Code of Federal Regulations, 40 CFR 60 appendix A, Method 6, July 2019 (Exclude Sampling)
2.3 บรรยากาศทั่วไป (ambient air)	- Hydrogen fluoride 5 µg/sample to 400 µg/sample - Hydrogen chloride 5 µg/sample to 400 µg/sample - Volatile organic compounds (VOCs) • Chloroethene 0.05 µg/m ³ to 51.00 µg/m ³ • 1,3 - butadiene 0.04 µg/m ³ to 44.00 µg/m ³ • Bromomethane 0.08 µg/m ³ to 77.00 µg/m ³ • Acrolein 0.05 µg/m ³ to 45.00 µg/m ³ • Acrylonitrile 0.04 µg/m ³ to 43.00 µg/m ³ • Dichloromethane 0.14 µg/m ³ to 69.00 µg/m ³ • Carbon disulfide 0.06 µg/m ³ to 62.00 µg/m ³ • Trichloromethane 0.20 µg/m ³ to 97.00 µg/m ³	- In-house method : WI-7.2-1-22 based on US.EPA, Code of Federal Regulations, 40 CFR 60 appendix A Method 26, 2019 (Exclude Sampling) - In-house method :WI-7.2-1-24 based on US.EPA , Compendium Method TO - 15, EPA / 625 / R-96 / 010b, January 1999 (Include sampling)

รายละเอียดแนบท้ายใบรับรองห้องปฏิบัติการทดสอบ
ใบรับรองเลขที่ 20T173/1151

หมายเลขการรับรองที่ ทดสอบ 0394

สถานภาพห้องปฏิบัติการ ☒ ถาวร ☐ นอกสถานที่ ☐ชั่วคราว ☐เคลื่อนที่

สาขาการทดสอบ	รายการทดสอบ	วิธีทดสอบ
<p>สาขาสิ่งแวดล้อม</p> <p>2. คุณภาพอากาศ (ต่อ) (air quality) (cont.)</p> <p>2.3 บรรยากาศทั่วไป (ต่อ) (ambient air) (cont.)</p>	<p>- Volatile organic compounds (VOCs) (cont.)</p> <ul style="list-style-type: none"> • 1,2 - dichloroethane 0.08 $\mu\text{g}/\text{m}^3$ to 80.00 $\mu\text{g}/\text{m}^3$ • Benzene 0.06 $\mu\text{g}/\text{m}^3$ to 63.00 $\mu\text{g}/\text{m}^3$ • Carbon tetrachloride 0.25 $\mu\text{g}/\text{m}^3$ to 125 $\mu\text{g}/\text{m}^3$ • Trichloroethylene 0.21 $\mu\text{g}/\text{m}^3$ to 107 $\mu\text{g}/\text{m}^3$ • 1,2 - dichloropropane 0.18 $\mu\text{g}/\text{m}^3$ to 92.00 $\mu\text{g}/\text{m}^3$ • Tetrachloroethylene 0.27 $\mu\text{g}/\text{m}^3$ to 135 $\mu\text{g}/\text{m}^3$ • 1,2 - dibromoethane 0.31 $\mu\text{g}/\text{m}^3$ to 153 $\mu\text{g}/\text{m}^3$ • 1,1,2,2 - tetrachloroethane 0.69 $\mu\text{g}/\text{m}^3$ to 137 $\mu\text{g}/\text{m}^3$ 	<p>- In-house method :WI-7.2-1-24 US.EPA , Compendium Method TO - 15, EPA / 625 / R-96 / 010b, January 1999 (Include sampling)</p>

รายละเอียดแนบท้ายใบรับรองห้องปฏิบัติการทดสอบ
ใบรับรองเลขที่ 20T173/1151

หมายเลขการรับรองที่ ทดสอบ 0394

สถานภาพห้องปฏิบัติการ ☒ ถาวร ☐ นอกสถานที่ ☐ชั่วคราว ☐เคลื่อนที่

สาขาการทดสอบ	รายการทดสอบ	วิธีทดสอบ
<p>สาขาสิ่งแวดล้อม</p> <p>2. คุณภาพอากาศ (ต่อ) (air quality) (cont.)</p> <p>2.3 บรรยากาศทั่วไป (ต่อ) (ambient air) (cont.)</p>	<p>- Volatile organic compounds (VOCs) (cont.)</p> <ul style="list-style-type: none"> • Benzyl chloride 0.52 $\mu\text{g}/\text{m}^3$ to 103 $\mu\text{g}/\text{m}^3$ • 1,4 - dichlorobenzene 0.24 $\mu\text{g}/\text{m}^3$ to 120 $\mu\text{g}/\text{m}^3$ 	<p>- In-house method :WI-7.2-1-24 US.EPA , Compendium Method TO - 15, EPA / 625 / R-96 / 010b, January 1999 (Include sampling)</p>

ออกให้ ณ วันที่ 9 กันยายน 2563

(นายวีระศักดิ์ วันทองธนวิชัย)
รองเลขาธิการ ปฏิบัติราชการแทน
เลขาธิการสำนักงานมาตรฐานผลิตภัณฑ์อุตสาหกรรม