

ภาคผนวก ค

## หนังสือรับรองผลการตรวจวัดและวิเคราะห์



บริษัท ซีคอต จำกัด  
SECOT CO., LTD.

239 ถนนริมคลองประปา แขวงบางซื่อ เขตบางซื่อ กรุงเทพมหานคร 10800

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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	: Kuwait Petroleum Aviation (Thailand) Ltd.	REQUEST SERVICE No.	: 1609/66
	(Feeder Line Project)	SAMPLING METHOD	: Pneumatic Bladder Pump
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING TIME	: 14:30-14:42
SAMPLING DATE	: 13/09/2023	ANALYTICAL DATE	: 13, 15-22/09/2023
RECEIVED DATE	: 15/09/2023	SITE OPERATOR	: Mr. Jeerawat Khothamhan
REPORT DATE	: 25/09/2023	FILE CODE	: 223100_GW_September
SAMPLE CONDITION	: Normal		

PARAMETER	UNIT	ANALYSIS	ND	STATION
		METHODS	(non-detectable)	MW-2
Depth	m			4.11
Temperature	°C	2550 B	< 0.5	32.1
pH		4500-H <sup>+</sup> B	< 0.10	3.90
Color	Unit	2120 B	< 5.0	< 5
Conductivity	µS/cm	2510 B	< 1.0	3,517
Total Dissolved Solids	mg/l	2540 C	< 50	1,792
Total Suspended Solids	mg/l	2540 D	< 5	16

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

( Miss Khemchuda Insorn )

Analyst

( Mrs. Araya Tipparuk )

Technical Management Team

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SAMPLE CONDITION	: Normal		

PARAMETER	UNIT	ANALYSIS	ND	STATION	STANDARD <sup>1/</sup>
		METHODS	(non-detectable)	MW-2	
Benzene	mg/l	6200 B	< 0.0002	ND	≤ 0.2
Carbon tetrachloride	mg/l	6200 B	< 0.0002	ND	≤ 0.4
1,2-Dichloroethane	mg/l	6200 B	< 0.0002	ND	≤ 0.5
Dichloromethane	mg/l	6200 B	< 0.0002	0.0009	≤ 6.0
1,1-Dichloroethylene	mg/l	6200 B	< 0.0002	ND	≤ 0.1
cis-1,2-Dichloroethylene	mg/l	6200 B	< 0.0002	ND	≤ 2.0
trans-1,2-Dichloroethylene	mg/l	6200 B	< 0.0002	ND	≤ 5.0
Ethylbenzene	mg/l	6200 B	< 0.0002	ND	≤ 2.0
Styrene	mg/l	6200 B	< 0.0002	ND	≤ 24
Tetrachloroethylene	mg/l	6200 B	< 0.0002	ND	≤ 0.9
Toluene	mg/l	6200 B	< 0.0002	ND	≤ 5.0
1,1,1-Trichloroethane	mg/l	6200 B	< 0.0002	ND	≤ 0.2
1,1,2-Trichloroethane	mg/l	6200 B	< 0.0002	ND	≤ 0.8
Trichloroethylene	mg/l	6200 B	< 0.0002	ND	≤ 4.4
m-Xylene	mg/l	6200 B	< 0.0002	ND	≤ 24
o-Xylene	mg/l	6200 B	< 0.0002	ND	≤ 24
p-Xylene	mg/l	6200 B	< 0.0002	ND	≤ 24
Total Xylenes	mg/l	6200 B	< 0.0006	ND	≤ 24
Vinyl Chloride	mg/l	6200 B	< 0.0005	ND	≤ 0.03

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

Jutarat Jaemruen  
( Miss Jutarat Jaemruen )

Analyst

REG. NO. ๓-239-๓-0022

Araya Tipparuk  
( Mrs. Araya Tipparuk )

Technical Management Team

REG. NO. ๓-239-๓-0004

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SAMPLE CONDITION	: Normal		

PARAMETER	UNIT	ANALYSIS METHODS	ND (non-detectable)	STATION MW-2	STANDARD <sup>1/</sup>
<b>Total Petroleum Hydrocarbons</b>					
- C <sub>5</sub> -C <sub>8</sub>	mg/l	5030 C / 8260 D	< 0.003	ND	≤ 1.4
- Pentane					
- Benzene					
- Toluene					
- m,p-Xylene					
- o-Xylene					
- C <sub>8</sub> -C <sub>16</sub>	mg/l	3510 C / 8015 D	< 0.025	ND	≤ 1.7
- n-Nonane					
- n-Decane					
- n-Dodecane					
- n-Tetradecane					
- n-Hexadecane					
- C <sub>16</sub> -C <sub>35</sub>	mg/l	3510 C / 8015 D	< 0.050	ND	≤ 0.1
- n-Octadecane					
- n-Eicosane					
- n-Docosane					
- n-Tetracosane					
- n-Hexacosane					
- n-Octacosane					
- n-Triacontane					
- n-Dotriacontane					
- n-Tetratriacontane					
- Pentatriacontane					

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

Sudaporn S.

(Miss Sudaporn Soonthorn)

Analyst

REG. NO. ๖-239-๖-0001

Araya T

(Mrs. Araya Tipparuk)

Technical Management Team

REG. NO. ๖-239-๖-0004

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SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Pneumatic Bladder Pump
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REPORT DATE	: 25/09/2023	SITE OPERATOR	: Mr. Jeerawat Khothamhan
SAMPLE CONDITION	: Normal	FILE CODE	: 223100_GW_September

PARAMETER	UNIT	ANALYSIS	ND	STATION
		METHODS	(non-detectable)	MW-4
Depth	m			3.50
Temperature	°C	2550 B	< 0.5	31.0
pH		4500-H <sup>+</sup> B	< 0.10	6.55
Color	Unit	2120 B	< 5.0	10
Conductivity	µS/cm	2510 B	< 1.0	2,784
Total Dissolved Solids	mg/l	2540 C	< 50	2,245
Total Suspended Solids	mg/l	2540 D	< 5	87

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



( Miss Khemchuda Insorn )

Analyst



( Mrs. Araya Tipparuk )

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SAMPLE CONDITION	: Normal		

PARAMETER	UNIT	ANALYSIS	ND	STATION	STANDARD <sup>1/</sup>
		METHODS	(non-detectable)	MW-4	
Benzene	mg/l	6200 B	< 0.0002	ND	≤ 0.2
Carbon tetrachloride	mg/l	6200 B	< 0.0002	ND	≤ 0.4
1,2-Dichloroethane	mg/l	6200 B	< 0.0002	ND	≤ 0.5
Dichloromethane	mg/l	6200 B	< 0.0002	0.0010	≤ 6.0
1,1-Dichloroethylene	mg/l	6200 B	< 0.0002	ND	≤ 0.1
cis-1,2-Dichloroethylene	mg/l	6200 B	< 0.0002	ND	≤ 2.0
trans-1,2-Dichloroethylene	mg/l	6200 B	< 0.0002	ND	≤ 5.0
Ethylbenzene	mg/l	6200 B	< 0.0002	ND	≤ 2.0
Styrene	mg/l	6200 B	< 0.0002	ND	≤ 24
Tetrachloroethylene	mg/l	6200 B	< 0.0002	ND	≤ 0.9
Toluene	mg/l	6200 B	< 0.0002	ND	≤ 5.0
1,1,1-Trichloroethane	mg/l	6200 B	< 0.0002	ND	≤ 0.2
1,1,2-Trichloroethane	mg/l	6200 B	< 0.0002	ND	≤ 0.8
Trichloroethylene	mg/l	6200 B	< 0.0002	ND	≤ 4.4
m-Xylene	mg/l	6200 B	< 0.0002	ND	≤ 24
o-Xylene	mg/l	6200 B	< 0.0002	ND	≤ 24
p-Xylene	mg/l	6200 B	< 0.0002	ND	≤ 24
Total Xylenes	mg/l	6200 B	< 0.0006	ND	≤ 24
Vinyl Chloride	mg/l	6200 B	< 0.0005	ND	≤ 0.03

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

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( Miss Jutarat Jaemruen )

Analyst

REG. NO. ๖-239-๖-0022

Araya Tipparuk  
( Mrs. Araya Tipparuk )

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SAMPLE CONDITION	: Normal		

PARAMETER	UNIT	ANALYSIS METHODS	ND (non-detectable)	STATION MW-4	STANDARD <sup>1/</sup>
<b>Total Petroleum Hydrocarbons</b>					
- C <sub>5</sub> -C <sub>8</sub>	mg/l	5030 C / 8260 D	< 0.003	ND	≤ 1.4
- Pentane					
- Benzene					
- Toluene					
- m,p-Xylene					
- o-Xylene					
- C <sub>8</sub> -C <sub>16</sub>	mg/l	3510 C / 8015 D	< 0.025	ND	≤ 1.7
- n-Nonane					
- n-Decane					
- n-Dodecane					
- n-Tetradecane					
- n-Hexadecane					
- C <sub>16</sub> -C <sub>35</sub>	mg/l	3510 C / 8015 D	< 0.050	ND	≤ 0.1
- n-Octadecane					
- n-Eicosane					
- n-Docosane					
- n-Tetracosane					
- n-Hexacosane					
- n-Octacosane					
- n-Triacontane					
- n-Dotriacontane					
- n-Tetratriacontane					
- Pentatriacontane					

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

Sudaporn S.

(Miss Sudaporn Soonthorn)

Analyst

REG. NO. ๖-239-๖-0001

(Mrs. Araya Tipparuk)

Technical Management Team

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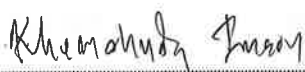
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REPORT DATE	: 25/09/2023	FILE CODE	: 223100_GW_September
SAMPLE CONDITION	: Normal		

PARAMETER	UNIT	ANALYSIS	ND	STATION
		METHODS	(non-detectable)	MW-6
Depth	m			3.70
Temperature	°C	2550 B	< 0.5	33.8
pH		4500-H <sup>+</sup> B	< 0.10	6.65
Color	Unit	2120 B	< 5.0	90
Conductivity	µS/cm	2510 B	< 1.0	1,017
Total Dissolved Solids	mg/l	2540 C	< 50	497
Total Suspended Solids	mg/l	2540 D	< 5	35

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



( Miss Khemchuda Insorn )

Analyst



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SAMPLE CONDITION	: Normal		

PARAMETER	UNIT	ANALYSIS	ND	STATION	STANDARD <sup>1/</sup>
		METHODS	(non-detectable)	MW-6	
Benzene	mg/l	6200 B	< 0.0002	ND	≤ 0.2
Carbon tetrachloride	mg/l	6200 B	< 0.0002	ND	≤ 0.4
1,2-Dichloroethane	mg/l	6200 B	< 0.0002	ND	≤ 0.5
Dichloromethane	mg/l	6200 B	< 0.0002	0.0010	≤ 6.0
1,1-Dichloroethylene	mg/l	6200 B	< 0.0002	ND	≤ 0.1
cis-1,2-Dichloroethylene	mg/l	6200 B	< 0.0002	ND	≤ 2.0
trans-1,2-Dichloroethylene	mg/l	6200 B	< 0.0002	ND	≤ 5.0
Ethylbenzene	mg/l	6200 B	< 0.0002	ND	≤ 2.0
Styrene	mg/l	6200 B	< 0.0002	ND	≤ 24
Tetrachloroethylene	mg/l	6200 B	< 0.0002	ND	≤ 0.9
Toluene	mg/l	6200 B	< 0.0002	ND	≤ 5.0
1,1,1-Trichloroethane	mg/l	6200 B	< 0.0002	ND	≤ 0.2
1,1,2-Trichloroethane	mg/l	6200 B	< 0.0002	ND	≤ 0.8
Trichloroethylene	mg/l	6200 B	< 0.0002	ND	≤ 4.4
m-Xylene	mg/l	6200 B	< 0.0002	0.0005	≤ 24
o-Xylene	mg/l	6200 B	< 0.0002	ND	≤ 24
p-Xylene	mg/l	6200 B	< 0.0002	0.0004	≤ 24
Total Xylenes	mg/l	6200 B	< 0.0006	0.0009	≤ 24
Vinyl Chloride	mg/l	6200 B	< 0.0005	ND	≤ 0.03

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

Jutarat Jaemruen

(Miss Jutarat Jaemruen)

Analyst

REG. NO. ๖-239-๖-0022

(Mrs. Araya Tipparuk)

Technical Management Team

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SAMPLE CONDITION	: Normal		

PARAMETER	UNIT	ANALYSIS	ND	STATION	STANDARD <sup>1/</sup>
		METHODS	(non-detectable)	MW-6	
<u>Total Petroleum Hydrocarbons</u>					
- C <sub>5</sub> -C <sub>8</sub>	mg/l	5030 C / 8260 D	< 0.003	0.009	≤ 1.4
- Pentane					
- Benzene					
- Toluene					
- m,p-Xylene					
- o-Xylene					
-C <sub>8</sub> -C <sub>16</sub>	mg/l	3510 C / 8015 D	< 0.025	0.043	≤ 1.7
- n-Nonane					
- n-Decane					
- n-Dodecane					
- n-Tetradecane					
- n-Hexadecane					
-C <sub>&gt;16</sub> -C <sub>35</sub>	mg/l	3510 C / 8015 D	< 0.050	0.098	≤ 0.1
- n-Octadecane					
- n-Eicosane					
- n-Docosane					
- n-Tetracosane					
- n-Hexacosane					
- n-Octacosane					
- n-Triacontane					
- n-Dotriacontane					
- n-Tetratriacontane					
- Pentatriacontane					

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

Sudaporn S.  
(Miss Sudaporn Soonthorn)

Analyst

REG. NO. 2-239-0-0001

Araya Tipparuk  
(Mrs. Araya Tipparuk)

Technical Management Team

REG. NO. 2-239-0-0004

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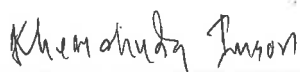
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GROUND WATER ANALYSIS REPORT

CLIENT NAME	: Kuwait Petroleum Aviation (Thailand) Ltd.	REQUEST SERVICE No.	: 1609/66
	(Feeder Line Project)	SAMPLING METHOD	: Pneumatic Bladder Pump
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING TIME	: 10:30-10:45
SAMPLING DATE	: 14/09/2023	ANALYTICAL DATE	: 14, 15-22/09/2023
RECEIVED DATE	: 15/09/2023	SITE OPERATOR	: Mr. Jeerawat Khothamhan
REPORT DATE	: 25/09/2023	FILE CODE	: 223100_GW_September
SAMPLE CONDITION	: Normal		

PARAMETER	UNIT	ANALYSIS METHODS	ND (non-detectable)	STATION MW-7
Depth	m	-	-	2.92
Temperature	°C	2550 B	< 0.5	32.5
pH	-	4500-H <sup>+</sup> B	< 0.10	7.02
Color	Unit	2120 B	< 5.0	30
Conductivity	µS/cm	2510 B	< 1.0	318
Total Dissolved Solids	mg/l	2540 C	< 50	210
Total Suspended Solids	mg/l	2540 D	< 5	9

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



( Miss Khemchuda Insorn )

Analyst



( Mrs. Araya Tipparuk )

Technical Management Team

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GROUND WATER ANALYSIS REPORT

CLIENT NAME	: Kuwait Petroleum Aviation (Thailand) Ltd.	REQUEST SERVICE No.	: 1609/66
	(Feeder Line Project)	SAMPLING METHOD	: Pneumatic Bladder Pump
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING TIME	: 10:30-10:45
SAMPLING DATE	: 14/09/2023	ANALYTICAL DATE	: 20-21/09/2023
RECEIVED DATE	: 15/09/2023	SITE OPERATOR	: Mr. Jeerawat Khothamhan
REPORT DATE	: 25/09/2023	FILE CODE	: 223100_GW_September
SAMPLE CONDITION	: Normal		

PARAMETER	UNIT	ANALYSIS	ND	STATION	STANDARD <sup>1/</sup>
		METHODS	(non-detectable)	MW-7	
Benzene	mg/l	6200 B	< 0.0002	ND	≤ 0.2
Carbon tetrachloride	mg/l	6200 B	< 0.0002	ND	≤ 0.4
1,2-Dichloroethane	mg/l	6200 B	< 0.0002	ND	≤ 0.5
Dichloromethane	mg/l	6200 B	< 0.0002	0.0018	≤ 6.0
1,1-Dichloroethylene	mg/l	6200 B	< 0.0002	ND	≤ 0.1
cis-1,2-Dichloroethylene	mg/l	6200 B	< 0.0002	ND	≤ 2.0
trans-1,2-Dichloroethylene	mg/l	6200 B	< 0.0002	ND	≤ 5.0
Ethylbenzene	mg/l	6200 B	< 0.0002	ND	≤ 2.0
Styrene	mg/l	6200 B	< 0.0002	ND	≤ 24
Tetrachloroethylene	mg/l	6200 B	< 0.0002	ND	≤ 0.9
Toluene	mg/l	6200 B	< 0.0002	ND	≤ 5.0
1,1,1-Trichloroethane	mg/l	6200 B	< 0.0002	ND	≤ 0.2
1,1,2-Trichloroethane	mg/l	6200 B	< 0.0002	ND	≤ 0.8
Trichloroethylene	mg/l	6200 B	< 0.0002	ND	≤ 4.4
m-Xylene	mg/l	6200 B	< 0.0002	ND	≤ 24
o-Xylene	mg/l	6200 B	< 0.0002	ND	≤ 24
p-Xylene	mg/l	6200 B	< 0.0002	ND	≤ 24
Total Xylenes	mg/l	6200 B	< 0.0006	ND	≤ 24
Vinyl Chloride	mg/l	6200 B	< 0.0005	ND	≤ 0.03

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

Jutarat Jaemruen  
( Miss Jutarat Jaemruen )

Analyst

REG. NO. 2-239-0-0022

Araya Tipparuk  
( Mrs. Araya Tipparuk )

Technical Management Team

REG. NO. 2-239-0-0004

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GROUND WATER ANALYSIS REPORT

CLIENT NAME	: Kuwait Petroleum Aviation (Thailand) Ltd.	REQUEST SERVICE No.	: 1609/66
	(Feeder Line Project)	SAMPLING METHOD	: Pneumatic Bladder Pump
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING TIME	: 10:30-10:45
SAMPLING DATE	: 14/09/2023	ANALYTICAL DATE	: 19-20/09/2023
RECEIVED DATE	: 15/09/2023	SITE OPERATOR	: Mr. Jeerawat Khothamhan
REPORT DATE	: 25/09/2023	FILE CODE	: 223100_GW_September
SAMPLE CONDITION	: Normal		

PARAMETER	UNIT	ANALYSIS METHODS	ND (non-detectable)	STATION MW-7	STANDARD <sup>1/</sup>
<u>Total Petroleum Hydrocarbons</u>					
- C <sub>5</sub> -C <sub>8</sub>	mg/l	5030 C / 8260 D	< 0.003	ND	≤ 1.4
- Pentane					
- Benzene					
- Toluene					
- m,p-Xylene					
- o-Xylene					
- C <sub>9</sub> -C <sub>16</sub>	mg/l	3510 C / 8015 D	< 0.025	ND	≤ 1.7
- n-Nonane					
- n-Decane					
- n-Dodecane					
- n-Tetradecane					
- n-Hexadecane					
- C <sub>17</sub> -C <sub>35</sub>	mg/l	3510 C / 8015 D	< 0.050	ND	≤ 0.1
- n-Octadecane					
- n-Eicosane					
- n-Docosane					
- n-Tetracosane					
- n-Hexacosane					
- n-Octacosane					
- n-Triacontane					
- n-Dotriacontane					
- n-Tetratriacontane					
- Pentatriacontane					

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

Sudaporn S.  
(Miss Sudaporn Soonthorn)

Analyst

REG. NO. ๖-239-๖-0001

( Mrs. Araya Tipparuk )

Technical Management Team

REG. NO. ๖-239-๖-0004

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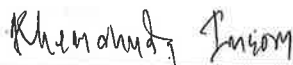
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GROUND WATER ANALYSIS REPORT

CLIENT NAME	: Kuwait Petroleum Aviation (Thailand) Ltd. (Feeder Line Project)	REQUEST SERVICE No.	: 1609/66
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Pneumatic Bladder Pump
SAMPLING DATE	: 12/09/2023	SAMPLING TIME	: 13:55-14:07
RECEIVED DATE	: 15/09/2023	ANALYTICAL DATE	: 12, 15-22/09/2023
REPORT DATE	: 25/09/2023	SITE OPERATOR	: Mr. Jeerawat Khothamhan
SAMPLE CONDITION	: Normal	FILE CODE	: 223100_GW_September

PARAMETER	UNIT	ANALYSIS	ND	STATION
		METHODS	(non-detectable)	MW-8
Depth	m			4.60
Temperature	°C	2550 B	< 0.5	32.9
pH		4500-H <sup>+</sup> B	< 0.10	3.70
Color	Unit	2120 B	< 5.0	20
Conductivity	µS/cm	2510 B	< 1.0	8,411
Total Dissolved Solids	mg/l	2540 C	< 50	4,848
Total Suspended Solids	mg/l	2540 D	< 5	9

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



( Miss Khemchuda Insorn )

Analyst



( Mrs. Araya Tipparuk )

Technical Management Team

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GROUND WATER ANALYSIS REPORT

CLIENT NAME	: Kuwait Petroleum Aviation (Thailand) Ltd.	REQUEST SERVICE No.	: 1609/66
	(Feeder Line Project)	SAMPLING METHOD	: Pneumatic Bladder Pump
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING TIME	: 13:55-14:07
SAMPLING DATE	: 12/09/2023	ANALYTICAL DATE	: 20-21/09/2023
RECEIVED DATE	: 15/09/2023	SITE OPERATOR	: Mr. Jeerawat Khothamhan
REPORT DATE	: 25/09/2023	FILE CODE	: 223100_GW_September
SAMPLE CONDITION	: Normal		

PARAMETER	UNIT	ANALYSIS	ND	STATION	STANDARD <sup>1/</sup>
		METHODS	(non-detectable)	MW-8	
Benzene	mg/l	6200 B	< 0.0002	ND	≤ 0.2
Carbon tetrachloride	mg/l	6200 B	< 0.0002	ND	≤ 0.4
1,2-Dichloroethane	mg/l	6200 B	< 0.0002	ND	≤ 0.5
Dichloromethane	mg/l	6200 B	< 0.0002	0.0011	≤ 6.0
1,1-Dichloroethylene	mg/l	6200 B	< 0.0002	ND	≤ 0.1
cis-1,2-Dichloroethylene	mg/l	6200 B	< 0.0002	ND	≤ 2.0
trans-1,2-Dichloroethylene	mg/l	6200 B	< 0.0002	ND	≤ 5.0
Ethylbenzene	mg/l	6200 B	< 0.0002	ND	≤ 2.0
Styrene	mg/l	6200 B	< 0.0002	ND	≤ 24
Tetrachloroethylene	mg/l	6200 B	< 0.0002	ND	≤ 0.9
Toluene	mg/l	6200 B	< 0.0002	ND	≤ 5.0
1,1,1-Trichloroethane	mg/l	6200 B	< 0.0002	ND	≤ 0.2
1,1,2-Trichloroethane	mg/l	6200 B	< 0.0002	ND	≤ 0.8
Trichloroethylene	mg/l	6200 B	< 0.0002	ND	≤ 4.4
m-Xylene	mg/l	6200 B	< 0.0002	ND	≤ 24
o-Xylene	mg/l	6200 B	< 0.0002	ND	≤ 24
p-Xylene	mg/l	6200 B	< 0.0002	ND	≤ 24
Total Xylenes	mg/l	6200 B	< 0.0006	ND	≤ 24
Vinyl Chloride	mg/l	6200 B	< 0.0005	ND	≤ 0.03

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

Jutarat Jaemruen

( Miss Jutarat Jaemruen )

Analyst

REG. NO. 7-239-จ-0022

( Mrs. Araya Tipparuk )

Technical Management Team

REG. NO. 7-239-ค-0004

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GROUND WATER ANALYSIS REPORT

CLIENT NAME	: Kuwait Petroleum Aviation (Thailand) Ltd. (Feeder Line Project)	REQUEST SERVICE No.	: 1609/66
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Pneumatic Bladder Pump
SAMPLING DATE	: 12/09/2023	SAMPLING TIME	: 13:55-14:07
RECEIVED DATE	: 15/09/2023	ANALYTICAL DATE	: 19-20/09/2023
REPORT DATE	: 25/09/2023	SITE OPERATOR	: Mr. Jeerawat Khothamhan
SAMPLE CONDITION	: Normal	FILE CODE	: 223100_GW_September

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

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

Sudaporn S.  
(Miss Sudaporn Soonthorn)

Analyst

REG. NO. 1-239-1-0001

(Mrs. Araya Tipparuk)

Technical Management Team

REG. NO. 1-239-1-0004

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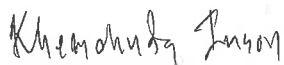
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GROUND WATER ANALYSIS REPORT

CLIENT NAME	: Kuwait Petroleum Aviation (Thailand) Ltd. (Feeder Line Project)	REQUEST SERVICE No.	: 1609/66
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Pneumatic Bladder Pump
SAMPLING DATE	: 12/09/2023	SAMPLING TIME	: 14:20-14:48
RECEIVED DATE	: 15/09/2023	ANALYTICAL DATE	: 12, 15-22/09/2023
REPORT DATE	: 25/09/2023	SITE OPERATOR	: Mr. Jeerawat Khothamhan
SAMPLE CONDITION	: Normal	FILE CODE	: 223100_GW_September

PARAMETER	UNIT	ANALYSIS	ND	STATION
		METHODS	(non-detectable)	MW-10
Depth	m	-	-	3.40
Temperature	°C	2550 B	< 0.5	30.9
pH	-	4500-H <sup>+</sup> B	< 0.10	6.51
Color	Unit	2120 B	< 5.0	40
Conductivity	µS/cm	2510 B	< 1.0	942
Total Dissolved Solids	mg/l	2540 C	< 50	524
Total Suspended Solids	mg/l	2540 D	< 5	45

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



( Miss Khemchuda Insorn )

Analyst



( Mrs. Araya Tipparuk )

Technical Management Team

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GROUND WATER ANALYSIS REPORT

CLIENT NAME	: Kuwait Petroleum Aviation (Thailand) Ltd.	REQUEST SERVICE No.	: 1609/66
	(Feeder Line Project)	SAMPLING METHOD	: Pneumatic Bladder Pump
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING TIME	: 14:20-14:48
SAMPLING DATE	: 12/09/2023	ANALYTICAL DATE	: 20-21/09/2023
RECEIVED DATE	: 15/09/2023	SITE OPERATOR	: Mr. Jeerawat Khothamhan
REPORT DATE	: 25/09/2023	FILE CODE	: 223100_GW_September
SAMPLE CONDITION	: Normal		

PARAMETER	UNIT	ANALYSIS	ND	STATION	STANDARD <sup>1/</sup>
		METHODS	(non-detectable)	MW-10	
Benzene	mg/l	6200 B	< 0.0002	ND	≤ 0.2
Carbon tetrachloride	mg/l	6200 B	< 0.0002	ND	≤ 0.4
1,2-Dichloroethane	mg/l	6200 B	< 0.0002	ND	≤ 0.5
Dichloromethane	mg/l	6200 B	< 0.0002	0.0012	≤ 6.0
1,1-Dichloroethylene	mg/l	6200 B	< 0.0002	ND	≤ 0.1
cis-1,2-Dichloroethylene	mg/l	6200 B	< 0.0002	ND	≤ 2.0
trans-1,2-Dichloroethylene	mg/l	6200 B	< 0.0002	ND	≤ 5.0
Ethylbenzene	mg/l	6200 B	< 0.0002	ND	≤ 2.0
Styrene	mg/l	6200 B	< 0.0002	ND	≤ 24
Tetrachloroethylene	mg/l	6200 B	< 0.0002	ND	≤ 0.9
Toluene	mg/l	6200 B	< 0.0002	ND	≤ 5.0
1,1,1-Trichloroethane	mg/l	6200 B	< 0.0002	ND	≤ 0.2
1,1,2-Trichloroethane	mg/l	6200 B	< 0.0002	ND	≤ 0.8
Trichloroethylene	mg/l	6200 B	< 0.0002	ND	≤ 4.4
m-Xylene	mg/l	6200 B	< 0.0002	ND	≤ 24
o-Xylene	mg/l	6200 B	< 0.0002	ND	≤ 24
p-Xylene	mg/l	6200 B	< 0.0002	ND	≤ 24
Total Xylenes	mg/l	6200 B	< 0.0006	ND	≤ 24
Vinyl Chloride	mg/l	6200 B	< 0.0005	ND	≤ 0.03

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

Jutarat Jaemruen

( Miss Jutarat Jaemruen )

Analyst

REG. NO. ๓-239-๓-0022

Araya Tipparuk

( Mrs. Araya Tipparuk )

Technical Management Team

REG. NO. ๓-239-๓-0004

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GROUND WATER ANALYSIS REPORT

CLIENT NAME	Kuwait Petroleum Aviation (Thailand) Ltd.	REQUEST SERVICE No.	1609/66
	(Feeder Line Project)	SAMPLING METHOD	Pneumatic Bladder Pump
SAMPLING BY	SECOT Co., Ltd.	SAMPLING TIME	14:20-14:48
SAMPLING DATE	12/09/2023	ANALYTICAL DATE	19-20/09/2023
RECEIVED DATE	15/09/2023	SITE OPERATOR	Mr. Jeerawat Khothamhan
REPORT DATE	25/09/2023	FILE CODE	223100_GW_September
SAMPLE CONDITION	Normal		

PARAMETER	UNIT	ANALYSIS	ND	STATION	STANDARD <sup>1/</sup>
		METHODS	(non-detectable)	MW-10	
<u>Total Petroleum Hydrocarbons</u>					
- C <sub>5</sub> -C <sub>8</sub>	mg/l	5030 C / 8260 D	< 0.003	ND	≤ 1.4
- Pentane					
- Benzene					
- Toluene					
- m,p-Xylene					
- o-Xylene					
-C <sub>&gt;8</sub> -C <sub>16</sub>	mg/l	3510 C / 8015 D	< 0.025	ND	≤ 1.7
- n-Nonane					
- n-Decane					
- n-Dodecane					
- n-Tetradecane					
- n-Hexadecane					
-C <sub>&gt;16</sub> -C <sub>35</sub>	mg/l	3510 C / 8015 D	< 0.050	ND	≤ 0.1
- n-Octadecane					
- n-Eicosane					
- n-Docosane					
- n-Tetracosane					
- n-Hexacosane					
- n-Octacosane					
- n-Triacontane					
- n-Dotriacontane					
- n-Tetratriacontane					
- Pentatriacontane					

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

Sudaporn S.  
(Miss Sudaporn Soonthorn)

Analyst

REG. NO. ว-239-จ-0001

( Mrs. Araya Tipparuk )

Technical Management Team

REG. NO. ว-239-ค-0004

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3. <sup>1/</sup> Notification of the Ministry of Industry, B.E.2559 (2016).



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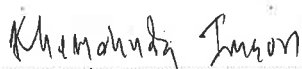
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GROUND WATER ANALYSIS REPORT

CLIENT NAME	: Kuwait Petroleum Aviation (Thailand) Ltd. (Feeder Line Project)	REQUEST SERVICE No.	: 1609/66
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Pneumatic Bladder Pump
SAMPLING DATE	: 14/09/2023	SAMPLING TIME	: 09:58-10:15
RECEIVED DATE	: 15/09/2023	ANALYTICAL DATE	: 14, 15-22/09/2023
REPORT DATE	: 25/09/2023	SITE OPERATOR	: Mr. Jeerawat Khothamhan
SAMPLE CONDITION	: Normal	FILE CODE	: 223100_GW_September

PARAMETER	UNIT	ANALYSIS	ND	STATION
		METHODS	(non-detectable)	MW-16
Depth	m			4.24
Temperature	°C	2550 B	< 0.5	32.5
pH		4500-H <sup>+</sup> B	< 0.10	6.54
Color	Unit	2120 B	< 5.0	240
Conductivity	µS/cm	2510 B	< 1.0	1,195
Total Dissolved Solids	mg/l	2540 C	< 50	716
Total Suspended Solids	mg/l	2540 D	< 5	80

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



( Miss Khemchuda Insom )

Analyst



( Mrs. Araya Tipparuk )

Technical Management Team

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GROUND WATER ANALYSIS REPORT

CLIENT NAME	: Kuwait Petroleum Aviation (Thailand) Ltd.	REQUEST SERVICE No.	: 1609/66
	(Feeder Line Project)	SAMPLING METHOD	: Pneumatic Bladder Pump
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING TIME	: 09:58-10:15
SAMPLING DATE	: 14/09/2023	ANALYTICAL DATE	: 20-21/09/2023
RECEIVED DATE	: 15/09/2023	SITE OPERATOR	: Mr. Jeerawat Khothamhan
REPORT DATE	: 25/09/2023	FILE CODE	: 223100_GW_September
SAMPLE CONDITION	: Normal		

PARAMETER	UNIT	ANALYSIS	ND	STATION	STANDARD <sup>1/</sup>
		METHODS *	(non-detectable)	MW-16	
Benzene	mg/l	6200 B	< 0.0002	ND	≤ 0.2
Carbon tetrachloride	mg/l	6200 B	< 0.0002	ND	≤ 0.4
1,2-Dichloroethane	mg/l	6200 B	< 0.0002	ND	≤ 0.5
Dichloromethane	mg/l	6200 B	< 0.0002	0.0013	≤ 6.0
1,1-Dichloroethylene	mg/l	6200 B	< 0.0002	ND	≤ 0.1
cis-1,2-Dichloroethylene	mg/l	6200 B	< 0.0002	ND	≤ 2.0
trans-1,2-Dichloroethylene	mg/l	6200 B	< 0.0002	ND	≤ 5.0
Ethylbenzene	mg/l	6200 B	< 0.0002	ND	≤ 2.0
Styrene	mg/l	6200 B	< 0.0002	ND	≤ 24
Tetrachloroethylene	mg/l	6200 B	< 0.0002	ND	≤ 0.9
Toluene	mg/l	6200 B	< 0.0002	ND	≤ 5.0
1,1,1-Trichloroethane	mg/l	6200 B	< 0.0002	ND	≤ 0.2
1,1,2-Trichloroethane	mg/l	6200 B	< 0.0002	ND	≤ 0.8
Trichloroethylene	mg/l	6200 B	< 0.0002	ND	≤ 4.4
m-Xylene	mg/l	6200 B	< 0.0002	ND	≤ 24
o-Xylene	mg/l	6200 B	< 0.0002	ND	≤ 24
p-Xylene	mg/l	6200 B	< 0.0002	ND	≤ 24
Total Xylenes	mg/l	6200 B	< 0.0006	ND	≤ 24
Vinyl Chloride	mg/l	6200 B	< 0.0005	ND	≤ 0.03

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

Jutarat Jaemruen

( Miss Jutarat Jaemruen )

Analyst

REG. NO. ว-239-ท-0022

Araya Tipparak

( Mrs. Araya Tipparak )

Technical Management Team

REG. NO. ว-239-ท-0004

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GROUND WATER ANALYSIS REPORT

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SAMPLING DATE	: 14/09/2023	SAMPLING TIME	: 09:58-10:15
RECEIVED DATE	: 15/09/2023	ANALYTICAL DATE	: 19-20/09/2023
REPORT DATE	: 25/09/2023	SITE OPERATOR	: Mr. Jeerawat Khothamhan
SAMPLE CONDITION	: Normal	FILE CODE	: 223100_GW_September

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

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

Sudaporn S.

(Miss Sudaporn Soonthorn)

Analyst

REG. NO. ๖-239-๖-0001

MR

( Mrs. Araya Tipparuk )

Technical Management Team

REG. NO. ๖-239-๖-0004

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GROUND WATER ANALYSIS REPORT

CLIENT NAME	: Kuwait Petroleum Aviation (Thailand) Ltd. (Feeder Line Project)	REQUEST SERVICE No.	: 1609/66
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Pneumatic Bladder Pump
SAMPLING DATE	: 13/09/2023	SAMPLING TIME	: 11:25-11:35
RECEIVED DATE	: 15/09/2023	ANALYTICAL DATE	: 13, 15-22/09/2023
REPORT DATE	: 25/09/2023	SITE OPERATOR	: Mr. Jeerawat Khothamhan
SAMPLE CONDITION	: Normal	FILE CODE	: 223100_GW_September

PARAMETER	UNIT	ANALYSIS	ND	STATION
		METHODS	(non-detectable)	GW-1
Depth	m			3.95
Temperature	°C	2550 B	< 0.5	32.5
pH		4500-H <sup>+</sup> B	< 0.10	5.98
Color	Unit	2120 B	< 5.0	730
Conductivity	µS/cm	2510 B	< 1.0	809
Total Dissolved Solids	mg/l	2540 C	< 50	590
Total Suspended Solids	mg/l	2540 D	< 5	18

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

( Miss Khemchuda Inson )

Analyst

( Mrs. Araya Tipparuk )

Technical Management Team

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GROUND WATER ANALYSIS REPORT

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SAMPLING DATE	: 13/09/2023	ANALYTICAL DATE	: 20-21/09/2023
RECEIVED DATE	: 15/09/2023	SITE OPERATOR	: Mr. Jeerawat Khothamhan
REPORT DATE	: 25/09/2023	FILE CODE	: 223100_GW_September
SAMPLE CONDITION	: Normal		

PARAMETER	UNIT	ANALYSIS	ND	STATION	STANDARD <sup>1/</sup>
		METHODS	(non-detectable)		
Benzene	mg/l	6200 B	< 0.0002	ND	≤ 0.2
Carbon tetrachloride	mg/l	6200 B	< 0.0002	ND	≤ 0.4
1,2-Dichloroethane	mg/l	6200 B	< 0.0002	ND	≤ 0.5
Dichloromethane	mg/l	6200 B	< 0.0002	0.0034	≤ 6.0
1,1-Dichloroethylene	mg/l	6200 B	< 0.0002	0.0003	≤ 0.1
cis-1,2-Dichloroethylene	mg/l	6200 B	< 0.0002	ND	≤ 2.0
trans-1,2-Dichloroethylene	mg/l	6200 B	< 0.0002	ND	≤ 5.0
Ethylbenzene	mg/l	6200 B	< 0.0002	ND	≤ 2.0
Styrene	mg/l	6200 B	< 0.0002	ND	≤ 24
Tetrachloroethylene	mg/l	6200 B	< 0.0002	ND	≤ 0.9
Toluene	mg/l	6200 B	< 0.0002	ND	≤ 5.0
1,1,1-Trichloroethane	mg/l	6200 B	< 0.0002	ND	≤ 0.2
1,1,2-Trichloroethane	mg/l	6200 B	< 0.0002	ND	≤ 0.8
Trichloroethylene	mg/l	6200 B	< 0.0002	ND	≤ 4.4
m-Xylene	mg/l	6200 B	< 0.0002	ND	≤ 24
o-Xylene	mg/l	6200 B	< 0.0002	ND	≤ 24
p-Xylene	mg/l	6200 B	< 0.0002	ND	≤ 24
Total Xylenes	mg/l	6200 B	< 0.0006	ND	≤ 24
Vinyl Chloride	mg/l	6200 B	< 0.0005	ND	≤ 0.03

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

Jutarat Jaemruen

(Miss Jutarat Jaemruen)

Analyst

REG. NO. ๖-239-๖-0022

NR

(Mrs. Araya Tippasuk)

Technical Management Team

REG. NO. ๖-239-๖-0004

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GROUND WATER ANALYSIS REPORT

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SAMPLING BY	: SECOT Co., Ltd.	SAMPLING TIME	: 11:25-11:35
SAMPLING DATE	: 13/09/2023	ANALYTICAL DATE	: 19-20/09/2023
RECEIVED DATE	: 15/09/2023	SITE OPERATOR	: Mr. Jeerawat Khothamhan
REPORT DATE	: 25/09/2023	FILE CODE	: 223100_GW_September
SAMPLE CONDITION	: Normal		

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

REFERENCE : US EPA SW 846 TEST METHODS FOR EVALUATING WATER AND SOLID WASTE 3<sup>rd</sup> ED. 2020

Sudaporn S.

(Miss Sudaporn Soonthorn)

Analyst

REG. NO. ว-239-จ-0001

Araya Tipparuk

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Technical Management Team

REG. NO. ว-239-ค-0004

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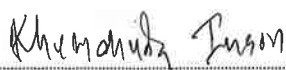
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GROUND WATER ANALYSIS REPORT

CLIENT NAME	: Kuwait Petroleum Aviation (Thailand) Ltd.	REQUEST SERVICE No.	: 1609/66
	(Feeder Line Project)	SAMPLING METHOD	: Pneumatic Bladder Pump
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING TIME	: 11:54-12:10
SAMPLING DATE	: 12/09/2023	ANALYTICAL DATE	: 12, 15-22/09/2023
RECEIVED DATE	: 15/09/2023	SITE OPERATOR	: Mr. Jeerawat Khothamhan
REPORT DATE	: 25/09/2023	FILE CODE	: 223100_GW_September
SAMPLE CONDITION	: Normal		

PARAMETER	UNIT	ANALYSIS	ND	STATION
		METHODS	(non-detectable)	GW-4
Depth	m	-	-	3.40
Temperature	°C	2550 B	< 0.5	32.9
pH	-	4500-H <sup>+</sup> B	< 0.10	6.60
Color	Unit	2120 B	< 5.0	140
Conductivity	µS/cm	2510 B	< 1.0	856
Total Dissolved Solids	mg/l	2540 C	< 50	508
Total Suspended Solids	mg/l	2540 D	< 5	18

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



( Miss Khemchuda Insorn )

Analyst



( Mrs. Araya Tipparuk )

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	(Feeder Line Project)	SAMPLING METHOD	: Pneumatic Bladder Pump
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REPORT DATE	: 25/09/2023	FILE CODE	: 223100_GW_September
SAMPLE CONDITION	: Normal		

PARAMETER	UNIT	ANALYSIS	ND	STATION	STANDARD <sup>1/</sup>
		METHODS	(non-detectable)	GW-4	
Benzene	mg/l	6200 B	< 0.0002	ND	≤ 0.2
Carbon tetrachloride	mg/l	6200 B	< 0.0002	ND	≤ 0.4
1,2-Dichloroethane	mg/l	6200 B	< 0.0002	ND	≤ 0.5
Dichloromethane	mg/l	6200 B	< 0.0002	0.0015	≤ 6.0
1,1-Dichloroethylene	mg/l	6200 B	< 0.0002	ND	≤ 0.1
cis-1,2-Dichloroethylene	mg/l	6200 B	< 0.0002	ND	≤ 2.0
trans-1,2-Dichloroethylene	mg/l	6200 B	< 0.0002	ND	≤ 5.0
Ethylbenzene	mg/l	6200 B	< 0.0002	ND	≤ 2.0
Styrene	mg/l	6200 B	< 0.0002	ND	≤ 24
Tetrachloroethylene	mg/l	6200 B	< 0.0002	ND	≤ 0.9
Toluene	mg/l	6200 B	< 0.0002	ND	≤ 5.0
1,1,1-Trichloroethane	mg/l	6200 B	< 0.0002	ND	≤ 0.2
1,1,2-Trichloroethane	mg/l	6200 B	< 0.0002	ND	≤ 0.8
Trichloroethylene	mg/l	6200 B	< 0.0002	ND	≤ 4.4
m-Xylene	mg/l	6200 B	< 0.0002	ND	≤ 24
o-Xylene	mg/l	6200 B	< 0.0002	ND	≤ 24
p-Xylene	mg/l	6200 B	< 0.0002	ND	≤ 24
Total Xylenes	mg/l	6200 B	< 0.0006	ND	≤ 24
Vinyl Chloride	mg/l	6200 B	< 0.0005	ND	≤ 0.03

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

Jutarat Jaemruen

( Miss Jutarat Jaemruen )

Analyst

REG. NO. ว-239-จ-0022

MR

( Mrs. Araya Tipparuk )

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REG. NO. ว-239-ค-0004

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RECEIVED DATE	: 15/09/2023	SITE OPERATOR	: Mr. Jeerawat Khothamhan
REPORT DATE	: 25/09/2023	FILE CODE	: 223100_GW_September
SAMPLE CONDITION	: Normal		

PARAMETER	UNIT	ANALYSIS METHODS	ND (non-detectable)	STATION GW-4	STANDARD <sup>1/</sup>
<b>Total Petroleum Hydrocarbons</b>					
- C <sub>5</sub> -C <sub>8</sub>	mg/l	5030 C / 8260 D	< 0.003	ND	≤ 1.4
- Pentane					
- Benzene					
- Toluene					
- m,p-Xylene					
- o-Xylene					
- C <sub>8</sub> -C <sub>16</sub>	mg/l	3510 C / 8015 D	< 0.025	ND	≤ 1.7
- n-Nonane					
- n-Decane					
- n-Dodecane					
- n-Tetradecane					
- n-Hexadecane					
- C <sub>16</sub> -C <sub>35</sub>	mg/l	3510 C / 8015 D	< 0.050	ND	≤ 0.1
- n-Octadecane					
- n-Eicosane					
- n-Docosane					
- n-Tetracosane					
- n-Hexacosane					
- n-Octacosane					
- n-Triacontane					
- n-Dotriacontane					
- n-Tetratriacontane					
- Pentatriacontane					

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

Sudaporn S.  
(Miss Sudaporn Soonthorn)

Analyst

REG. NO. 2-239-ก-0001

(Mrs. Araya Tipparuk)

Technical Management Team

REG. NO. 2-239-ค-0004

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3. <sup>1/</sup> Notification of the Ministry of Industry, B.E.2559 (2016).



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GROUND WATER ANALYSIS REPORT

CLIENT NAME	: Kuwait Petroleum Aviation (Thailand) Ltd.	REQUEST SERVICE No.	: 1609/66
	(Feeder Line Project)	SAMPLING METHOD	: Pneumatic Bladder Pump
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING TIME	: 11:33-11:42
SAMPLING DATE	: 12/09/2023	ANALYTICAL DATE	: 12, 15-22/09/2023
RECEIVED DATE	: 15/09/2023	SITE OPERATOR	: Mr. Jeerawat Khothamhan
REPORT DATE	: 25/09/2023	FILE CODE	: 223100_GW_September
SAMPLE CONDITION	: Normal		

PARAMETER	UNIT	ANALYSIS	ND	STATION
		METHODS	(non-detectable)	GW-5
Depth	m			2.91
Temperature	°C	2550 B	< 0.5	33.0
pH		4500-H <sup>+</sup> B	< 0.10	6.15
Color	Unit	2120 B	< 5.0	130
Conductivity	µS/cm	2510 B	< 1.0	456
Total Dissolved Solids	mg/l	2540 C	< 50	272
Total Suspended Solids	mg/l	2540 D	< 5	34

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



( Miss Khemchuda Insorn )

Analyst



( Mrs. Araya Tippasuk )

Technical Management Team

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GROUND WATER ANALYSIS REPORT

CLIENT NAME	: Kuwait Petroleum Aviation (Thailand) Ltd.	REQUEST SERVICE No.	: 1609/66
	(Feeder Line Project)	SAMPLING METHOD	: Pneumatic Bladder Pump
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING TIME	: 11:33-11:42
SAMPLING DATE	: 12/09/2023	ANALYTICAL DATE	: 20-21/09/2023
RECEIVED DATE	: 15/09/2023	SITE OPERATOR	: Mr. Jeerawat Khothamhan
REPORT DATE	: 25/09/2023	FILE CODE	: 223100_GW_September
SAMPLE CONDITION	: Normal		

PARAMETER	UNIT	ANALYSIS	ND	STATION	STANDARD <sup>1/</sup>
		METHODS	(non-detectable)	GW-5	
Benzene	mg/l	6200 B	< 0.0002	ND	≤ 0.2
Carbon tetrachloride	mg/l	6200 B	< 0.0002	ND	≤ 0.4
1,2-Dichloroethane	mg/l	6200 B	< 0.0002	ND	≤ 0.5
Dichloromethane	mg/l	6200 B	< 0.0002	0.0015	≤ 6.0
1,1-Dichloroethylene	mg/l	6200 B	< 0.0002	ND	≤ 0.1
cis-1,2-Dichloroethylene	mg/l	6200 B	< 0.0002	ND	≤ 2.0
trans-1,2-Dichloroethylene	mg/l	6200 B	< 0.0002	ND	≤ 5.0
Ethylbenzene	mg/l	6200 B	< 0.0002	ND	≤ 2.0
Styrene	mg/l	6200 B	< 0.0002	ND	≤ 24
Tetrachloroethylene	mg/l	6200 B	< 0.0002	ND	≤ 0.9
Toluene	mg/l	6200 B	< 0.0002	ND	≤ 5.0
1,1,1-Trichloroethane	mg/l	6200 B	< 0.0002	ND	≤ 0.2
1,1,2-Trichloroethane	mg/l	6200 B	< 0.0002	ND	≤ 0.8
Trichloroethylene	mg/l	6200 B	< 0.0002	ND	≤ 4.4
m-Xylene	mg/l	6200 B	< 0.0002	ND	≤ 24
o-Xylene	mg/l	6200 B	< 0.0002	ND	≤ 24
p-Xylene	mg/l	6200 B	< 0.0002	ND	≤ 24
Total Xylenes	mg/l	6200 B	< 0.0006	ND	≤ 24
Vinyl Chloride	mg/l	6200 B	< 0.0005	ND	≤ 0.03

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

Jutarat Jaemruen

( Miss Jutarat Jaemruen )

Analyst

REG. NO. ๖-239-๖-0022

Araya Tipparuk

( Mrs. Araya Tipparuk )

Technical Management Team

REG. NO. ๖-239-๖-0004

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REPORT DATE	: 25/09/2023	FILE CODE	: 223100_GW_September
SAMPLE CONDITION	: Normal		

PARAMETER	UNIT	ANALYSIS METHODS	ND (non-detectable)	STATION GW-5	STANDARD <sup>1/</sup>
Total Petroleum Hydrocarbons					
- C <sub>5</sub> -C <sub>8</sub>	mg/l	5030 C / 8260 D	< 0.003	ND	≤ 1.4
- Pentane					
- Benzene					
- Toluene					
- m,p-Xylene					
- o-Xylene					
- C <sub>8</sub> -C <sub>16</sub>	mg/l	3510 C / 8015 D	< 0.025	ND	≤ 1.7
- n-Nonane					
- n-Decane					
- n-Dodecane					
- n-Tetradecane					
- n-Hexadecane					
- C <sub>16</sub> -C <sub>35</sub>	mg/l	3510 C / 8015 D	< 0.050	ND	≤ 0.1
- n-Octadecane					
- n-Eicosane					
- n-Docosane					
- n-Tetracosane					
- n-Hexacosane					
- n-Octacosane					
- n-Triacontane					
- n-Dotriacontane					
- n-Tetratriacontane					
- Pentatriacontane					

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

Sudaporn S.  
(Miss Sudaporn Soonthorn)

Analyst

REG. NO. 2-239-ท-0001

(Mrs. Araya Tipparuk)

Technical Management Team

REG. NO. 2-239-ท-0004

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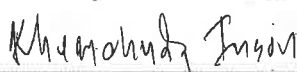
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GROUND WATER ANALYSIS REPORT

CLIENT NAME	: Kuwait Petroleum Aviation (Thailand) Ltd. (Feeder Line Project)	REQUEST SERVICE No.	: 1609/66
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Pneumatic Bladder Pump
SAMPLING DATE	: 12/09/2023	SAMPLING TIME	: 10:49-11:06
RECEIVED DATE	: 15/09/2023	ANALYTICAL DATE	: 12, 15-22/09/2023
REPORT DATE	: 25/09/2023	SITE OPERATOR	: Mr. Jeerawat Khothamhan
SAMPLE CONDITION	: Normal	FILE CODE	: 223100_GW_September

PARAMETER	UNIT	ANALYSIS	ND	STATION
		METHODS	(non-detectable)	GW-8
Depth	m	-	-	3.06
Temperature	°C	2550 B	< 0.5	32.5
pH	-	4500-H <sup>+</sup> B	< 0.10	6.79
Color	Unit	2120 B	< 5.0	35
Conductivity	µS/cm	2510 B	< 1.0	180
Total Dissolved Solids	mg/l	2540 C	< 50	138
Total Suspended Solids	mg/l	2540 D	< 5	51

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



( Miss Khemchuda Insorn )

Analyst



( Mrs. Araya Tippasuk )

Technical Management Team

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REPORT DATE	: 25/09/2023	FILE CODE	: 223100_GW_September
SAMPLE CONDITION	: Normal		

PARAMETER	UNIT	ANALYSIS	ND	STATION	STANDARD <sup>1/</sup>
		METHODS	(non-detectable)	GW-8	
Benzene	mg/l	6200 B	< 0.0002	ND	≤ 0.2
Carbon tetrachloride	mg/l	6200 B	< 0.0002	ND	≤ 0.4
1,2-Dichloroethane	mg/l	6200 B	< 0.0002	ND	≤ 0.5
Dichloromethane	mg/l	6200 B	< 0.0002	0.0019	≤ 6.0
1,1-Dichloroethylene	mg/l	6200 B	< 0.0002	ND	≤ 0.1
cis-1,2-Dichloroethylene	mg/l	6200 B	< 0.0002	ND	≤ 2.0
trans-1,2-Dichloroethylene	mg/l	6200 B	< 0.0002	ND	≤ 5.0
Ethylbenzene	mg/l	6200 B	< 0.0002	ND	≤ 2.0
Styrene	mg/l	6200 B	< 0.0002	ND	≤ 24
Tetrachloroethylene	mg/l	6200 B	< 0.0002	ND	≤ 0.9
Toluene	mg/l	6200 B	< 0.0002	ND	≤ 5.0
1,1,1-Trichloroethane	mg/l	6200 B	< 0.0002	ND	≤ 0.2
1,1,2-Trichloroethane	mg/l	6200 B	< 0.0002	ND	≤ 0.8
Trichloroethylene	mg/l	6200 B	< 0.0002	ND	≤ 4.4
m-Xylene	mg/l	6200 B	< 0.0002	ND	≤ 24
o-Xylene	mg/l	6200 B	< 0.0002	ND	≤ 24
p-Xylene	mg/l	6200 B	< 0.0002	ND	≤ 24
Total Xylenes	mg/l	6200 B	< 0.0006	ND	≤ 24
Vinyl Chloride	mg/l	6200 B	< 0.0005	ND	≤ 0.03

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

Jutarat Jaemruen  
(Miss Jutarat Jaemruen)

Analyst

REG. NO. ๖-239-๓-0022

  
(Mrs. Araya Tipparak)

Technical Management Team

REG. NO. ๖-239-๓-0004

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GROUND WATER ANALYSIS REPORT

CLIENT NAME	: Kuwait Petroleum Aviation (Thailand) Ltd. (Feeder Line Project)	REQUEST SERVICE No.	: 1609/66
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SAMPLING DATE	: 12/09/2023	SAMPLING TIME	: 10:49-11:06
RECEIVED DATE	: 15/09/2023	ANALYTICAL DATE	: 19-20/09/2023
REPORT DATE	: 25/09/2023	SITE OPERATOR	: Mr. Jeerawat Khothamhan
SAMPLE CONDITION	: Normal	FILE CODE	: 223100_GW_September

PARAMETER	UNIT	ANALYSIS METHODS	ND (non-detectable)	STATION GW-8	STANDARD <sup>1/</sup>
<b>Total Petroleum Hydrocarbons</b>					
- C <sub>5</sub> -C <sub>8</sub>	mg/l	5030 C / 8260 D	< 0.003	ND	≤ 1.4
- Pentane					
- Benzene					
- Toluene					
- m,p-Xylene					
- o-Xylene					
- C <sub>8</sub> -C <sub>16</sub>	mg/l	3510 C / 8015 D	< 0.025	ND	≤ 1.7
- n-Nonane					
- n-Decane					
- n-Dodecane					
- n-Tetradecane					
- n-Hexadecane					
- C <sub>16</sub> -C <sub>35</sub>	mg/l	3510 C / 8015 D	< 0.050	ND	≤ 0.1
- n-Octadecane					
- n-Eicosane					
- n-Docosane					
- n-Tetracosane					
- n-Hexacosane					
- n-Octacosane					
- n-Triacontane					
- n-Dotriacontane					
- n-Tetratriacontane					
- Pentatriacontane					

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

Sudaporn S.

(Miss Sudaporn Soonthorn)

Analyst

REG. NO. ๓-239-๓-0001

Araya T

( Mrs. Araya Tipparuk )

Technical Management Team

REG. NO. ๓-239-๓-0004

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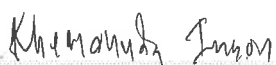
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GROUND WATER ANALYSIS REPORT

CLIENT NAME	: Kuwait Petroleum Aviation (Thailand) Ltd. (Feeder Line Project)	REQUEST SERVICE No.	: 1609/66
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Pneumatic Bladder Pump
SAMPLING DATE	: 14/09/2023	SAMPLING TIME	: 11:00-11:24
RECEIVED DATE	: 15/09/2023	ANALYTICAL DATE	: 14, 15-22/09/2023
REPORT DATE	: 25/09/2023	SITE OPERATOR	: Mr. Jeerawat Khothamhan
SAMPLE CONDITION	: Normal	FILE CODE	: 223100_GW_September

PARAMETER	UNIT	ANALYSIS	ND	STATION
		METHODS	(non-detectable)	GW-11
Depth	m			2.50
Temperature	°C	2550 B	< 0.5	34.0
pH		4500-H <sup>+</sup> B	< 0.10	6.46
Color	Unit	2120 B	< 5.0	80
Conductivity	µS/cm	2510 B	< 1.0	1,784
Total Dissolved Solids	mg/l	2540 C	< 50	823
Total Suspended Solids	mg/l	2540 D	< 5	78

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



( Miss Khemchuda Insorn )

Analyst



( Mrs. Araya Tipparuk )

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REPORT DATE	: 25/09/2023	FILE CODE	: 223100_GW_September
SAMPLE CONDITION	: Normal		

PARAMETER	UNIT	ANALYSIS METHODS	ND (non-detectable)	STATION	STANDARD <sup>1/</sup>
				GW-11	
Benzene	mg/l	6200 B	< 0.0002	ND	≤ 0.2
Carbon tetrachloride	mg/l	6200 B	< 0.0002	ND	≤ 0.4
1,2-Dichloroethane	mg/l	6200 B	< 0.0002	ND	≤ 0.5
Dichloromethane	mg/l	6200 B	< 0.0002	0.0013	≤ 6.0
1,1-Dichloroethylene	mg/l	6200 B	< 0.0002	ND	≤ 0.1
cis-1,2-Dichloroethylene	mg/l	6200 B	< 0.0002	ND	≤ 2.0
trans-1,2-Dichloroethylene	mg/l	6200 B	< 0.0002	ND	≤ 5.0
Ethylbenzene	mg/l	6200 B	< 0.0002	ND	≤ 2.0
Styrene	mg/l	6200 B	< 0.0002	ND	≤ 24
Tetrachloroethylene	mg/l	6200 B	< 0.0002	ND	≤ 0.9
Toluene	mg/l	6200 B	< 0.0002	ND	≤ 5.0
1,1,1-Trichloroethane	mg/l	6200 B	< 0.0002	ND	≤ 0.2
1,1,2-Trichloroethane	mg/l	6200 B	< 0.0002	ND	≤ 0.8
Trichloroethylene	mg/l	6200 B	< 0.0002	ND	≤ 4.4
m-Xylene	mg/l	6200 B	< 0.0002	ND	≤ 24
o-Xylene	mg/l	6200 B	< 0.0002	ND	≤ 24
p-Xylene	mg/l	6200 B	< 0.0002	ND	≤ 24
Total Xylenes	mg/l	6200 B	< 0.0006	ND	≤ 24
Vinyl Chloride	mg/l	6200 B	< 0.0005	ND	≤ 0.03

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

Jutarat Jaemruen

( Miss Jutarat Jaemruen )

Analyst

REG. NO. ๖-239-๖-0022

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( Mrs. Araya Tipparuk )

Technical Management Team

REG. NO. ๖-239-๖-0004

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SAMPLE CONDITION	: Normal	FILE CODE	: 223100_GW_September

PARAMETER	UNIT	ANALYSIS METHODS	ND (non-detectable)	STATION GW-11	STANDARD <sup>1/</sup>
<u>Total Petroleum Hydrocarbons</u>					
- C <sub>5</sub> -C <sub>8</sub>	mg/l	5030 C / 8260 D	< 0.003	ND	≤ 1.4
- Pentane					
- Benzene					
- Toluene					
- m,p-Xylene					
- o-Xylene					
- C <sub>8</sub> -C <sub>16</sub>	mg/l	3510 C / 8015 D	< 0.025	ND	≤ 1.7
- n-Nonane					
- n-Decane					
- n-Dodecane					
- n-Tetradecane					
- n-Hexadecane					
- C <sub>16</sub> -C <sub>35</sub>	mg/l	3510 C / 8015 D	< 0.050	ND	≤ 0.1
- n-Octadecane					
- n-Eicosane					
- n-Docosane					
- n-Tetracosane					
- n-Hexacosane					
- n-Octacosane					
- n-Triacontane					
- n-Dotriacontane					
- n-Tetratriacontane					
- Pentatriacontane					

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

Sudaporn S.

(Miss Sudaporn Soonthorn)

Analyst

REG. NO. ว-239-ท-0001

Araya

( Mrs. Araya Tipparuk )

Technical Management Team

REG. NO. ว-239-ท-0004

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3. <sup>1/</sup> Notification of the Ministry of Industry, B.E.2559 (2016).



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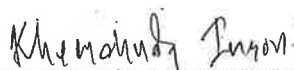
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GROUND WATER ANALYSIS REPORT

CLIENT NAME	: Kuwait Petroleum Aviation (Thailand) Ltd.	REQUEST SERVICE No.	: 1609/66
	(Feeder Line Project)	SAMPLING METHOD	: Pneumatic Bladder Pump
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING TIME	: 14:55-15:20
SAMPLING DATE	: 13/09/2023	ANALYTICAL DATE	: 13, 15-22/09/2023
RECEIVED DATE	: 15/09/2023	SITE OPERATOR	: Mr. Jeerawat Khothamhan
REPORT DATE	: 25/09/2023	FILE CODE	: 223100_GW_September
SAMPLE CONDITION	: Normal		


PARAMETER	UNIT	ANALYSIS	ND	STATION
		METHODS	(non-detectable)	GW-17
Depth	m	-	-	2.94
Temperature	°C	2550 B	< 0.5	33.9
pH	-	4500-H <sup>+</sup> B	< 0.10	5.52
Color	Unit	2120 B	< 5.0	15
Conductivity	µS/cm	2510 B	< 1.0	3,596
Total Dissolved Solids	mg/l	2540 C	< 50	1,868
Total Suspended Solids	mg/l	2540 D	< 5	29

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



( Miss Khemchuda Insorn )

Analyst



( Mrs. Araya Tipparuk )

Technical Management Team

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GROUND WATER ANALYSIS REPORT

CLIENT NAME	: Kuwait Petroleum Aviation (Thailand) Ltd.	REQUEST SERVICE No.	: 1609/66
	(Feeder Line Project)	SAMPLING METHOD	: Pneumatic Bladder Pump
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING TIME	: 14:55-15:20
SAMPLING DATE	: 13/09/2023	ANALYTICAL DATE	: 20-21/09/2023
RECEIVED DATE	: 15/09/2023	SITE OPERATOR	: Mr. Jeerawat Khothamhan
REPORT DATE	: 25/09/2023	FILE CODE	: 223100_GW_September
SAMPLE CONDITION	: Normal		

PARAMETER	UNIT	ANALYSIS	ND	STATION	STANDARD <sup>1/</sup>
		METHODS	(non-detectable)	GW-17	
Benzene	mg/l	6200 B	< 0.0002	ND	≤ 0.2
Carbon tetrachloride	mg/l	6200 B	< 0.0002	ND	≤ 0.4
1,2-Dichloroethane	mg/l	6200 B	< 0.0002	ND	≤ 0.5
Dichloromethane	mg/l	6200 B	< 0.0002	0.0019	≤ 6.0
1,1-Dichloroethylene	mg/l	6200 B	< 0.0002	ND	≤ 0.1
cis-1,2-Dichloroethylene	mg/l	6200 B	< 0.0002	ND	≤ 2.0
trans-1,2-Dichloroethylene	mg/l	6200 B	< 0.0002	ND	≤ 5.0
Ethylbenzene	mg/l	6200 B	< 0.0002	ND	≤ 2.0
Styrene	mg/l	6200 B	< 0.0002	ND	≤ 24
Tetrachloroethylene	mg/l	6200 B	< 0.0002	ND	≤ 0.9
Toluene	mg/l	6200 B	< 0.0002	ND	≤ 5.0
1,1,1-Trichloroethane	mg/l	6200 B	< 0.0002	ND	≤ 0.2
1,1,2-Trichloroethane	mg/l	6200 B	< 0.0002	ND	≤ 0.8
Trichloroethylene	mg/l	6200 B	< 0.0002	ND	≤ 4.4
m-Xylene	mg/l	6200 B	< 0.0002	ND	≤ 24
o-Xylene	mg/l	6200 B	< 0.0002	ND	≤ 24
p-Xylene	mg/l	6200 B	< 0.0002	ND	≤ 24
Total Xylenes	mg/l	6200 B	< 0.0006	ND	≤ 24
Vinyl Chloride	mg/l	6200 B	< 0.0005	ND	≤ 0.03

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

Jutarat Jaemruen

( Miss Jutarat Jaemruen )

Analyst

REG. NO. ๓-239-๓-0022

( Mrs. Araya Tipparuk )

Technical Management Team

REG. NO. ๓-239-๓-0004

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GROUND WATER ANALYSIS REPORT

CLIENT NAME	: Kuwait Petroleum Aviation (Thailand) Ltd.	REQUEST SERVICE No.	: 1609/66
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RECEIVED DATE	: 15/09/2023	SITE OPERATOR	: Mr. Jeerawat Khothamhan
REPORT DATE	: 25/09/2023	FILE CODE	: 223100_GW_September
SAMPLE CONDITION	: Normal		

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

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

Sudaporn S.  
(Miss Sudaporn Soonthorn)

Analyst

REG. NO. ๖-239-๖-0001

(Mrs. Araya Tippiaruk)

Technical Management Team

REG. NO. ๖-239-๖-0004

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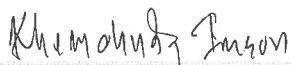
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GROUND WATER ANALYSIS REPORT

CLIENT NAME	: Kuwait Petroleum Aviation (Thailand) Ltd. (Feeder Line Project)	REQUEST SERVICE No.	: 1609/66
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Pneumatic Bladder Pump
SAMPLING DATE	: 14/09/2023	SAMPLING TIME	: 11:50
RECEIVED DATE	: 15/09/2023	ANALYTICAL DATE	: 14, 15-22/09/2023
REPORT DATE	: 25/09/2023	SITE OPERATOR	: Mr. Jeerawat Khothamhan
SAMPLE CONDITION	: Normal	FILE CODE	: 223100_GW_September

PARAMETER	UNIT	ANALYSIS	ND	STATION
		METHODS	(non-detectable)	บ่อน้ำบาดาลบริเวณชุมชนบ้านทุ่ง
Temperature	°C	2550 B	< 0.5	32.0
pH		4500-H <sup>+</sup> B	< 0.10	6.77
Color	Unit	2120 B	< 5.0	< 5
Conductivity	µS/cm	2510 B	< 1.0	1,171
Total Dissolved Solids	mg/l	2540 C	< 50	660
Total Suspended Solids	mg/l	2540 D	< 5	8

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



( Miss Khemchuda Insorn )

Analyst



( Mrs. Araya Tipparuk )

Technical Management Team

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GROUND WATER ANALYSIS REPORT

CLIENT NAME	: Kuwait Petroleum Aviation (Thailand) Ltd. (Feeder Line Project)	REQUEST SERVICE No.	: 1609/66
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING METHOD	: Pneumatic Bladder Pump
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REPORT DATE	: 25/09/2023	SITE OPERATOR	: Mr. Jeerawat Khothamhan
SAMPLE CONDITION	: Normal	FILE CODE	: 223100_GW_September

PARAMETER	UNIT	ANALYSIS METHODS	ND (non-detectable)	STATION	STANDARD <sup>1/</sup>
				บ่อน้ำบาดาลบริเวณชุมชนบ้านทุ่ง	
Benzene	mg/l	6200 B	< 0.0002	ND	≤ 0.2
Carbon tetrachloride	mg/l	6200 B	< 0.0002	ND	≤ 0.4
1,2-Dichloroethane	mg/l	6200 B	< 0.0002	ND	≤ 0.5
Dichloromethane	mg/l	6200 B	< 0.0002	0.0026	≤ 6.0
1,1-Dichloroethylene	mg/l	6200 B	< 0.0002	ND	≤ 0.1
cis-1,2-Dichloroethylene	mg/l	6200 B	< 0.0002	ND	≤ 2.0
trans-1,2-Dichloroethylene	mg/l	6200 B	< 0.0002	ND	≤ 5.0
Ethylbenzene	mg/l	6200 B	< 0.0002	ND	≤ 2.0
Styrene	mg/l	6200 B	< 0.0002	ND	≤ 24
Tetrachloroethylene	mg/l	6200 B	< 0.0002	ND	≤ 0.9
Toluene	mg/l	6200 B	< 0.0002	ND	≤ 5.0
1,1,1-Trichloroethane	mg/l	6200 B	< 0.0002	ND	≤ 0.2
1,1,2-Trichloroethane	mg/l	6200 B	< 0.0002	ND	≤ 0.8
Trichloroethylene	mg/l	6200 B	< 0.0002	ND	≤ 4.4
m-Xylene	mg/l	6200 B	< 0.0002	ND	≤ 24
o-Xylene	mg/l	6200 B	< 0.0002	ND	≤ 24
p-Xylene	mg/l	6200 B	< 0.0002	ND	≤ 24
Total Xylenes	mg/l	6200 B	< 0.0006	ND	≤ 24
Vinyl Chloride	mg/l	6200 B	< 0.0005	ND	≤ 0.03

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

Jutarat Jaemruen  
( Miss Jutarat Jaemruen )

Analyst

REG. NO. ๖-239-๖-0022

( Mrs. Araya Tipparuk )

Technical Management Team

REG. NO. ๖-239-๖-0004

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GROUND WATER ANALYSIS REPORT

CLIENT NAME	: Kuwait Petroleum Aviation (Thailand) Ltd.	REQUEST SERVICE No.	: 1609/66
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SAMPLING BY	: SECOT Co., Ltd.	SAMPLING TIME	: 11:50
SAMPLING DATE	: 14/09/2023	ANALYTICAL DATE	: 19-20/09/2023
RECEIVED DATE	: 15/09/2023	SITE OPERATOR	: Mr. Jeerawat Khothamhan
REPORT DATE	: 25/09/2023	FILE CODE	: 223100_GW_September
SAMPLE CONDITION	: Normal		

PARAMETER	UNIT	ANALYSIS METHODS	ND (non-detectable)	STATION บ่อน้ำบาดาลบริเวณชุมชนบ้านทุ่ง	STANDARD <sup>1/</sup>
<b>Total Petroleum Hydrocarbons</b>					
- C <sub>5</sub> -C <sub>8</sub>	mg/l	5030 C / 8260 D	< 0.003	ND	≤ 1.4
- Pentane					
- Benzene					
- Toluene					
- m,p-Xylene					
- o-Xylene					
- C <sub>8</sub> -C <sub>16</sub>	mg/l	3510 C / 8015 D	< 0.025	ND	≤ 1.7
- n-Nonane					
- n-Decane					
- n-Dodecane					
- n-Tetradecane					
- n-Hexadecane					
- C <sub>16</sub> -C <sub>35</sub>	mg/l	3510 C / 8015 D	< 0.050	ND	≤ 0.1
- n-Octadecane					
- n-Eicosane					
- n-Docosane					
- n-Tetracosane					
- n-Hexacosane					
- n-Octacosane					
- n-Triacontane					
- n-Dotriacontane					
- n-Tetratriacontane					
- Pentatriacontane					

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

Sudaporn S.  
(Miss Sudaporn Soonthorn)

Analyst

REG. NO. ๖-239-๖-0001

(Mrs. Araya Tipparuk)

Technical Management Team

REG. NO. ๖-239-๖-0004

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GROUND WATER ANALYSIS REPORT

CLIENT NAME	: Kuwait Petroleum Aviation (Thailand) Ltd.	REQUEST SERVICE No.	: 1609/66
	(Feeder Line Project)	SAMPLING METHOD	: Pneumatic Bladder Pump
SAMPLING BY	: SECOT Co., Ltd.	SAMPLING TIME	: 12:10
SAMPLING DATE	: 14/09/2023	ANALYTICAL DATE	: 14, 15-22/09/2023
RECEIVED DATE	: 15/09/2023	SITE OPERATOR	: Mr. Jeerawat Khothamhan
REPORT DATE	: 25/09/2023	FILE CODE	: 223100_GW_September
SAMPLE CONDITION	: Normal		

PARAMETER	UNIT	ANALYSIS	ND	STATION
		METHODS	(non-detectable)	บ่อน้ำบาดาลบริเวณวัดใหม่เนินพยอม
Temperature	°C	2550 B	< 0.5	33.4
pH	-	4500-H <sup>+</sup> B	< 0.10	6.71
Color	Unit	2120 B	< 5.0	< 5
Conductivity	µS/cm	2510 B	< 1.0	1,037
Total Dissolved Solids	mg/l	2540 C	< 50	560
Total Suspended Solids	mg/l	2540 D	< 5	5

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

*Khemchuda Insorn*

( Miss Khemchuda Insorn )

Analyst

*Araya Tippiaruk*

( Mrs. Araya Tippiaruk )

Technical Management Team

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GROUND WATER ANALYSIS REPORT

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SAMPLE CONDITION	: Normal		

PARAMETER	UNIT	ANALYSIS METHODS	ND (non-detectable)	STATION	STANDARD <sup>1/</sup>
				บ่อน้ำบาดาลบริเวณวัดใหม่เนินพยอม	
Benzene	mg/l	6200 B	< 0.0002	ND	≤ 0.2
Carbon tetrachloride	mg/l	6200 B	< 0.0002	ND	≤ 0.4
1,2-Dichloroethane	mg/l	6200 B	< 0.0002	ND	≤ 0.5
Dichloromethane	mg/l	6200 B	< 0.0002	0.0023	≤ 6.0
1,1-Dichloroethylene	mg/l	6200 B	< 0.0002	ND	≤ 0.1
cis-1,2-Dichloroethylene	mg/l	6200 B	< 0.0002	ND	≤ 2.0
trans-1,2-Dichloroethylene	mg/l	6200 B	< 0.0002	ND	≤ 5.0
Ethylbenzene	mg/l	6200 B	< 0.0002	ND	≤ 2.0
Styrene	mg/l	6200 B	< 0.0002	ND	≤ 24
Tetrachloroethylene	mg/l	6200 B	< 0.0002	ND	≤ 0.9
Toluene	mg/l	6200 B	< 0.0002	ND	≤ 5.0
1,1,1-Trichloroethane	mg/l	6200 B	< 0.0002	ND	≤ 0.2
1,1,2-Trichloroethane	mg/l	6200 B	< 0.0002	ND	≤ 0.8
Trichloroethylene	mg/l	6200 B	< 0.0002	ND	≤ 4.4
m-Xylene	mg/l	6200 B	< 0.0002	ND	≤ 24
o-Xylene	mg/l	6200 B	< 0.0002	ND	≤ 24
p-Xylene	mg/l	6200 B	< 0.0002	ND	≤ 24
Total Xylenes	mg/l	6200 B	< 0.0006	ND	≤ 24
Vinyl Chloride	mg/l	6200 B	< 0.0005	ND	≤ 0.03

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

Jutarat Jaemruen

( Miss Jutarat Jaemruen )

Analyst

REG. NO. ๖-239-๖-0022

( Mrs. Araya Tipparuk )

Technical Management Team

REG. NO. ๖-239-ก-0004

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SAMPLE CONDITION	: Normal		

PARAMETER	UNIT	ANALYSIS	ND	STATION	STANDARD <sup>1/</sup>
		METHODS	(non-detectable)	ป้อมน้ำบาดาลบริเวณวัดใหม่เนินพยอม	
<u>Total Petroleum Hydrocarbons</u>					
- C <sub>5</sub> -C <sub>8</sub>	mg/l	5030 C / 8260 D	< 0.003	ND	≤ 1.4
- Pentane					
- Benzene					
- Toluene					
- m,p-Xylene					
- o-Xylene					
-C <sub>&gt;8</sub> -C <sub>16</sub>	mg/l	3510 C / 8015 D	< 0.025	ND	≤ 1.7
- n-Nonane					
- n-Decane					
- n-Dodecane					
- n-Tetradecane					
- n-Hexadecane					
-C <sub>&gt;16</sub> -C <sub>35</sub>	mg/l	3510 C / 8015 D	< 0.050	ND	≤ 0.1
- n-Octadecane					
- n-Eicosane					
- n-Docosane					
- n-Tetracosane					
- n-Hexacosane					
- n-Octacosane					
- n-Triacontane					
- n-Dotriacontane					
- n-Tetratriacontane					
- Pentatriacontane					

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

Sudaporn S.

(Miss Sudaporn Soonthorn)

Analyst

REG. NO. 2-239-ก-0001

Araya Tipparuk

(Mrs. Araya Tipparuk)

Technical Management Team

REG. NO. 2-239-ก-0004

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

ภาคผนวก ง

## ใบแสดงการตรวจเทียบเครื่องมือตรวจวัดและวิเคราะห์



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 , 6<sup>th</sup> 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

(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

### 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 Valve :

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

Calibrated by : Sasipa Jaidee

(Miss Sasipa Jaidee)

Testing Officer

Date : 25/05/2023

Approved By : Narisa Poowasanpetch

(Miss Narisa Poowasanpetch)

Chief of Technical Management

Date : 25/05/2023

Issued Date : May 26, 2023



## TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)

CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES

534/4 PATTANAKARN ROAD SOI 18, SJANLUANG, 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  $\pm$  2.5) °C  
**Relative Humidity :** (50  $\pm$  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 Lernagatrakul

Approved by :

Approved Signatory

- ☒ Malee Butkruea  
☐ Saithip Meangmai  
☐ Warakorn Lernagatrakul

Issue Date : 10 January 2023

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.



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	2211306	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.

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a 1142465



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 CalibrationThe 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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Mala.

a 1142464



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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  $\pm$  2.5) °C  
**Relative Humidity :** (50  $\pm$  15) %  
**Calibration Procedure:** In-house method :  
- CP-CH6 : based on direct measurement by  
using certified reference material (CRM)  
**Calibrated by :** Walalak Sirithean  
**Approved by :**   
( ) Malee Butkruea  
( ) Saithip Meangmai  
( ) Warakorn Lernagatrakul  
**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



Cert.No.: 22CH1624

Page.: 2 of 2

### Condition of this result of calibration

#### 1. Reference Standard Instrument :-

Instrument	Serial No.	ID No.	Certificate No.	Due date
1) Thermometer	9549224	130RC003	221484	17 Apr 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 :-

- Conductivity calibration solution, CPA chem Ltd., The measurement results are traceable to SI through CPA chem Ltd., ANSI-ASQ National Accreditation Board, Accredited No. AR-1835  
- Conductivity calibration solution, Thermo Scientific (traceable to NIST)

Conductivity Solution	Manufacturer	Lot No.	Exp. date
*100 $\mu$ S/cm	Thermo Scientific	152/01	14 Apr 2023
1.413 mS/cm	CPA Chem	823328	20 June 2023
12.880 mS/cm	CPA Chem	823329	20 June 2023

- Control Conductivity calibration solution temperature by Water bath (25 $\pm$ 0.1) °C

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

### Calibration results

#### Function : Conductivity Measurement

(\*) After Adjustment at 1.413, 12.880 mS/cm

Conductivity Electrode Serial No.: 0720001N

Standard Conductivity Solution	Before Adjustment UUC* Reading	After Adjustment UUC* Reading	Uncertainty of Measurement ( $\pm$ )	Coverage factor k
*100 $\mu$ S/cm	99.36 $\mu$ S/cm	106.6 $\mu$ S/cm	5.1 $\mu$ S/cm	2.00
1.413 mS/cm	1.296 mS/cm	1.412 mS/cm	0.0093 mS/cm	2.00
12.880 mS/cm	10.86 mS/cm	12.88 mS/cm	0.086 mS/cm	2.00

#### Remark

- UUC\* = Unit Under Calibration

- \* = Not NSC - ONSC Accredited

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor k, providing a level of confidence of approximately 95 %.

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a 1137186



**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

*Mr. Anusit Boonmee*  
 ( Mr. Anusit Boonmee )

Calibration Engineer

Approved by

*Ms. 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.



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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 Sarna 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

*Ms. Jintana Sangthajaroenlap*



**BECTHAI BANGKOK EQUIPMENT & CHEMICAL CO., LTD.**  
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NSC-TISI-TIS 17025  
 CALIBRATION 0131

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 ( $\pm$ 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 ( $\pm$ 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



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NSC-TISI-TIS 17025  
 CALIBRATION 0131

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 -



## 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](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](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](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](https://www.agilent.com/cs/library/usermanuals/public/G3430-90052%207890B_Maintaining%20Guide.pdf)

Revision: 2.00, Issued: December 30, 2020  
 Agile Document Number: D0007063  
 DE number: 44166.759/222222  
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Page 1 of 4



## 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

CN13201053

Instrument System Site and Location

SECOT, Bangkok

List System Component Product Numbers

List the Serial Numbers of each Component

1.	G3940A	CN13201053
2.	G4513A	CN133501016
3.	G4519A	CN13230031
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	E190-6144	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 6005890893

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/scientresources>. 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                             | U913343B01                                |
| 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"/>					Yes selected means that the task was done or the part was required.
	<input checked="" type="checkbox"/>				No selected means that the task was not done or the part was not required.
		<input checked="" type="checkbox"/>			Interim selected means that this task is recommended to be done at 6-month intervals.
			<input checked="" type="checkbox"/>		Major selected means that this task is recommended to be done yearly; if the customer would like a service to be done at the 6-month interval then the service could be purchased.
				<input checked="" type="checkbox"/>	As needed selected means that the task was done or the part was used as needed. For example, there could be two types of filters that could be used and this was the one selected.

## Preventive Maintenance Procedures

☐ Service Not Applicable

## Interim / Major Preventive Maintenance – GCMS

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.

## Interim / Major Preventive Maintenance – System Checks

☐ Service Not Applicable

Yes/No	Interim/Major	System Checks
Yes/No	Interim/Major	Description
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Verify that calibration peaks were seen prior to starting the PM.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Vent the instrument.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Inspect vacuum hoses, pump, exhaust tubing, and power cords for excessive wear.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Visually inspect calibrant levels – PFTBA PFDTD (if appl.), IRM (if appl.). Refill if available.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Look for any obvious external damage or problems.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Clean air intake(s). Cosmetic cover(s) may need to be removed.
<input 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	Interim/Major	Wet Mechanical vacuum pumps
Yes/No	Interim/Major	Description

<input checked="" type="checkbox"/>	<input type="checkbox"/>	Check for evidence of oil leakage. Check pump gasket for leakage.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Drain and replace mechanical pump oil.
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Replace Oil Mist Filter if applicable.
<input 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"/>	Don't use mist filters with Chemical Ionization.
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Perform anti-suckback valve test. Power on until side plate is held closed, power off and check that side plate holds closed. Visually confirm that no oil returns up vacuum hose.

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

☒ Service Not Applicable

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

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

☒ Service Not Applicable

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

## 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 checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Remove dust from fans and vent covers,
<input checked="" type="checkbox"/>	<input checked="" 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 checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Open analyzer and remove the source.
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Disassemble, Clean, Re-assemble source.
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" 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 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 type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	CP17974 – Gas Clean Filter Kit GC/MS 178; Mount and Filter – if applicable.
<input type="checkbox"/>	<input checked="" 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"/>	S190-9071 – 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"/>	Pump system back down. Wait until system stability has been achieved.
<input checked="" type="checkbox"/>	<input 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"/>	Leak Check
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Verify system in manual tune
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Compare against previous tune file report(s)
<input checked="" type="checkbox"/>	<input 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"/>	Check manually that you have calibration peaks.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	EI 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
------------------	----------------------	--------------------

## 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 Trep, 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	5191-5851	✓	✓	
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)	5190-9561	✓	✓	✓
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	SR03706556	✓	✓	✓
Exhaust oil mist trap (thread) Edwards/Pfeiffer	G1099-80039	✓	✓	✓
Repeller Insulator	G1099-20133			✓
Lens stack insulator	G3870-20530			✓
Lens insulator for Extractor (ring insulator)	G3870-20445			✓
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
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
EI High Temperature Filaments	G7005-60061 Qty 2			✓
HES EI Filaments	G7002-60001			✓
LE-EI Filaments	G3850-60021			✓
CI High Temperature Filament – all MSDs	G7005-60072			✓
PFTBA GCMS 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, 90 um	5061-5396			✓
Alumina powder	393706201			✓
Cloths, clean (pkg of 15)	05980-60061			✓
Cloths, cleaning (pkg of 300)	9310-4828			✓
Cotton swabs (pkg of 100)	5080-5400			✓
Gloves, clean, large	8650-0030			✓
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: 6005830893

Date of Service Completion: 22 Feb 2023

Service Engineer Name: Smp 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. 0913201002
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.  
     o 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 Teldink 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



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

Agilent Technologies

Teledyne Tekmar ATOMX Purge and Trap  
Preventive Maintenance Checklist - Standard



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](http://www.agilent.com/chem/education)
- ☐ Need technical support, FAQs? - [www.agilent.com/chem/techsupp](http://www.agilent.com/chem/techsupp)
- ☐ Need supplies? - [www.agilent.com/chem/supplies](http://www.agilent.com/chem/supplies)

Service Completion

Service request number 6005830893 Date service completed 22 Feb 2023

Agilent signature [Signature] Customer signature [Signature]

Number of pages in this document \_\_\_\_\_

Issued: 30-09-2019, Revision:02

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Select pages for required products or Page 5 of 5

Agilent Technologies



## 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](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](https://www.agilent.com/cs/library/usermanuals/Public/7890B_Installation.pdf)
  - **Operation Manual**  
[https://www.agilent.com/cs/library/usermanuals/Public/7890B\\_Operation.pdf](https://www.agilent.com/cs/library/usermanuals/Public/7890B_Operation.pdf)
  - **Maintaining Your GC**  
[https://www.agilent.com/cs/library/usermanuals/public/G3430-90052%207890B\\_Maintaining%20Guide.pdf](https://www.agilent.com/cs/library/usermanuals/public/G3430-90052%207890B_Maintaining%20Guide.pdf)



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 Agile Document Number: D0013618  
 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

GC7890B

CN15343147

Instrument System Site and Location

Secot Co., Ltd. Instrument room.

List System Component Product Numbers

List the Serial Numbers of each Component

1.

G3440B

CN15343147

2.

G4513A

CN1910080

3.

G4514A

CN19080006

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 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 <i>HCD</i>	<i>N/A</i>	<i>126.2</i>
Back detector output <i>FID</i>	<i>N/A</i>	<i>22.6</i>
AUX detector output	<i>N/A</i>	<i>N/A</i>
Pressure decay test	Expected test result	Actual test result
Front inlet pressure decay test	Pass	<i>Pass</i>
Back inlet pressure decay test	Pass	<i>Pass</i>

## 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	<i>N/A</i>
SSL Capillary Inlet PM kit, split	5188-6496	7890A/B	<i>2</i>
SSL Capillary Ultra Inert Inlet Gold Seal with Washer	5190-6144	7890A/B	<i>N/A</i>
SSL Capillary Ultra Inert Inlet Splitless Liner - Single taper with Glass Wool	5190-2293	7890A/B	<i>N/A</i>
SSL Capillary Ultra Inert Inlet Low Pressure Drop Split Liner - with Glass Wool	5190-2295	7890A/B	<i>N/A</i>
PP inlet PM kit	5188-6498	7890A/B	<i>N/A</i>
Split vent trap PM kit, single cartridge (for MMI, PTV & VI)	5188-6495	7890A/B	<i>PA</i>
MMI Cleaning Kit	G3510-60820	7890A/B	<i>N/A</i>
PTV Septumless Head Rebuild Kit	5182-9747	7890A/B	<i>N/A</i>
PTV Septumless Head Teflon Guide	5182-9748	7890A/B	<i>N/A</i>
Ignitor (glow plug) assembly with O-ring	19231-60680	7890A/B	<i>1</i>
FID Collector Rebuild/Cleaning Kit	G1531-67000	7890A/B	<i>N/A</i>
Standard .011-inch FID Jet for capillary FID base	G1531-80560	7890A/B	<i>1</i>
High Temperature .018-inch FID Jet for capillary FID base	G1531-80620	7890A/B	<i>N/A</i>
Standard .018-inch FID Jet for packed column with packed FID base	18710-20119	7890A/B	<i>N/A</i>
Standard .011-inch FID Jet for capillary column with packed/adaptable FID base	19244-80560	7890A/B	<i>N/A</i>
High Temperature .018-inch FID Jet for capillary column with packed/adaptable FID base	19244-80620	7890A/B	<i>N/A</i>
NPD Jet, universal fit, .011-inch ID	G1534-80580	7890A/B	<i>N/A</i>
NPD Jet, universal fit, .011-inch ID Extended tip	G1534-80590	7890A/B	<i>N/A</i>
SSL Capillary Ultra Inert Inlet Gold Seal with Washer	5190-6144	7890A/B	<i>N/A</i>
SSL Capillary Ultra Inert Inlet Splitless Liner - Single taper with Glass Wool	5190-2293	7890A/B	<i>N/A</i>
**FID Collector Replacement Kit, if needed	G1531-67001	7890A/B	<i>N/A</i>

## 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

60264153

Date service completed

29 May 2023

Agilent signature



Customer signature



Total number of pages in this document

9 pages

## Certificate of Completion

Learner Name:	Saenguthai Saeng Tarak
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

## All Service and Support training certificates have the following specific limitations.

A certificate for Service and Support training is only valid while employed by Agilent Technologies or while working as an Agilent-authorized service provider, through which the service employee has ongoing access to Agilent's: Safety Alerts, Service Notes, internal technical updates, update training, current documentation, technical support, current parts, and parts updates. Completion of training alone, without being employed by Agilent Technologies, does not qualify an individual to safely install, service or maintain Agilent products.

## Certificate of Completion

Learner Name: Saenguthai Saeng Tarak


Title Of Course: AN-CE-GC-IL-022-A: Advanced GC Detectors Application and Troubleshooting Labs

Completion Date: November 25, 2014

Certified By Company: Learning at Agilent

All Service and Support training certificates have the following specific limitations.

A certificate for Service and Support training is only valid while employed by Agilent Technologies or while working as an Agilent-authorized service provider, through which the service employee has ongoing access to Agilent's: Safety Alerts, Service Notes, internal technical updates, update training, current documentation, technical support, current parts, and parts updates. Completion of training alone, without being employed by Agilent Technologies, does not qualify an individual to safely install, service or maintain Agilent products.

 <h3 style="margin: 0;">Certificate of Completion</h3>	
Learner Name:	Saenguthai Tarak
Title Of Course:	AN-CE-GC-IL-022-A: Advanced GC Detectors Application and Troubleshooting Labs
Completion Date:	March 18, 2016
Certified By Company:	Learning at Agilent
<p><small>All Service and Support training certificates have the following specific limitations:</small></p> <p><small>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.</small></p>	


## Calibration Certificate

**Certificate No.:** 2304081-003-01  
**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.:** 2304081  
**Operation No.:** 2304081-003  
**Date of Receipt:** 27 July 2023  
**Date of Calibration:** 27 July 2023

**Calibrated by** Mr. Worapob Sooktong  
Scientist

**Approved by**   
( Mr. Pheraphat Tuanjit )

Manager, Division of Calibration Laboratory

**Date of Issue:** 7 August 2023

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.:** 2304081-003-01  
**Equipment:** CHAMBER (Hot Air Oven)  
Model: ED 53 Serial No.: 01-27152  
Resolution: 1 °C ID No.: N/A  
Manufacturer: BINDER  
**Date of Calibration:** 27 July 2023

Page 2 of 3

**Location:** Laboratory, SECOT CO., LTD.  
**Environment Condition:** Ambient Temperature ( 32 ± 1 ) °C  
Relative Humidity ( 52 ± 2 ) %  
Line Voltage ( 228 ± 1 ) Volt

### Condition of this results of Calibration:

- This instrument was calibrated by insert 9 standard thermometer into its chamber and calibration according to W-TE-014 Based on TLAS G-20-1/02-08 (E): Guidelines for Calibration and Checks of Temperature Controlled Enclosures.  
- The temperature scale used was based on ITS - 90.  
- All data show below were final values and the initial data may be obtained upon request.

### 2. Reference Standard Instrument :

Instrument	Model	Serial No./ID No.	Certificate No.	Due Date	Through
Digital Thermometer with sensor	34972A	MY49016894	TE 660380-01	22 April 2024	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  
☐ Not Available

- Result of Calibration : ☒ Without adjustment ☐ After adjustment

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



## Calibration Report

Certificate No.:	2304081-003-01		
Equipment:	CHAMBER (Hot Air Oven)		
Model:	ED 53	Serial No.:	01-27152
Resolution:	1 °C	ID No.:	N/A
Manufacturer:	BINDER		

<b>Date of Calibration:</b>	27 July 2023
<b>Calibration point:</b>	104, 110 and 180 °C

Page 3 of 3

Calibration Condition	Temperature (°C)	Relative Humidity (%)	Line Voltage (Volt)
MIN	31.7	50.3	227.1
MAX	32.7	53.5	228.5

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	104.79	105.05	104.60	104.30	104.35	103.88	104.29	103.87	103.82	0.78
110	111.06	111.10	110.65	110.38	110.01	109.70	109.80	109.76	109.80	0.80
180	181.06	181.08	180.58	180.53	180.43	180.25	179.97	180.71	180.08	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	0.22	1.23	1.55
110	110	110	110	0.25	1.30	1.80
177	177	177	177	0.32	0.99	1.54

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.:** 2303092-001-01  
**Client name:** SECOT CO., LTD.  
**Address:** 239 Rimklongprapa Road, Bangsue,  
Bangsue, Bangkok 10800

Page 1 of 3

**Equipment:** CHAMBER (Hot Air Oven)

**Manufacturer:** MEMMERT

Model: UF 55

Serial No.: B213.0295

ID No.: N/A

Order No.: 2303092

**Operation No.:** 2303092-001

Date of Receipt: 26 May 2023

Date of Calibration: 26 May 2023

**Calibrated by** Mr.Jerawut Prapawuttipong  
Scientist

Approved by   
( Mr.Pheraphat Tuanjit )

**Manager, Division of Calibration Laboratory**

**Responsible for the Technical Management Team**

**Date of Issue:** 30 May 2023

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.



## Calibration Report

**Certificate No.:** 2303092-001-01  
**Equipment:** CHAMBER (Hot Air Oven)  
Model: UF 55 Serial No.: B213.0295  
Resolution: 0.1 °C ID No.: N/A  
Manufacturer: MEMMERT  
**Date of Calibration:** 26 May 2023

Page 2 of 3

**Location:** Walkway Laboratory, SECOT CO., LTD.  
**Environment Condition:** Ambient Temperature ( 30.5 ± 1 ) °C  
Relative Humidity ( 60 ± 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.

### 2. Reference Standard Instrument :

Instrument	Model	Serial No./ID No.	Certificate No.	Due Date	Through
Digital Thermometer with sensor	34972A	MY49016851	TE 660495-01	7 May 2024	NATIONAL FOOD INSTITUTE
	RTD	CH#201-209/ RTD#201-209			

- 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 80.0, 104.0 and 180.0 °C  
Fresh air Damper ☒ Open Position ☒  
☒ Close Fan 80%  
☒ Not Available

- Result of Calibration : ☒ Without adjustment ☐ After adjustment

## Calibration Certificate

**Certificate No.:** 2304081-002-01  
**Client name:** SECOT CO., LTD.  
**Address:** 239 Rimklongprapa Road,  
 Bangsue, Bangsue, Bangkok 10800

Page 1 of 3

**Equipment:** Water Bath  
**Manufacturer:** MEMMERT  
**Model:** WB 29  
**Serial No.:** I698.0051  
**ID No.:** N/A  
**Order No.:** 2304081  
**Operation No.:** 2304081-002  
**Date of Receipt:** 27 July 2023  
**Date of Calibration:** 27 July 2023

**Calibrated by** Mr.Worapob Sooktong  
 Scientist

**Approved by**   
 ( Mr.Pheraphat Tuanjit )

Manager, Division of Calibration Laboratory

**Date of Issue:** 7 August 2023 **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



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## Calibration Report

**Certificate No.:** 2304081-002-01  
**Equipment:** Water Bath  
 Model: WB 29 Serial No.: I698.0051  
 Resolution: 0.1 °C ID No.: N/A  
 Manufacturer: MEMMERT

**Date of Calibration:** 27 July 2023

Page 2 of 3

**Location:** Laboratory, SECOT CO., LTD.  
**Environment Condition:** Ambient Temperature ( 24 ± 1 ) °C  
 Relative Humidity ( 58 ± 2 ) %  
 Line Voltage ( 229 ± 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	MY49016894	TE 660380-01	22 April 2024	NATIONAL FOOD INSTITUTE
	RTD	RTD#201-205 / CH#201-205			

- This certificate is traceable to International System of Units (SI Units).
- This certificate was certified only for the instrument we calibrated.
- This result of calibration was found accurate as shown on date and place of calibration only.
- Condition of Calibrated item : Good
- UUC Description:

Time of Record 1 Hour 9 Minute At 95.0 °C

- Result of Calibration : ☒ Without adjustment  
☐ After adjustment

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



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## Calibration Report

**Certificate No.:** 2304081-002-01  
**Equipment:** Water Bath  
Model: WB 29 Serial No.: I698.0051  
Resolution: 0.1 °C ID No.: N/A  
Manufacturer: MEMMERT

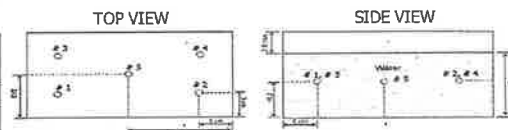
**Date of Calibration:** 27 July 2023

Page 3 of 3

**Calibration point:** 95.0 °C

**Calibration result:**

Calibration Condition	Temperature (°C)	Relative Humidity (%)	Line Voltage (Volt)
Min	23.0	56.3	227.5
Max	25.0	60.2	229.6



Sensor Installation Location

Table 1 : Reporting of Temperature

Calibration Point (°C)	Measured Temperature (°C) @ Sensor No. (Sensor No.5 is REF)					Uncertainty ± (°C)
	# 1	# 2	# 3	# 4	# 5	
95.0	95.03	94.96	95.10	94.97	95.02	0.28

Table 2 : Reporting of Characterization Result

UUC* Setting (°C)	UUC* reading (°C)			Stability ± (°C)	Uniformity (°C)	Overall Variation (°C)
	MIN	MAX	Average			
95.0	94.9	95.1	95.0	0.18	0.080	0.47

**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 -----





ภาคผนวก จ

หนังสืออนุญาตขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน  
จากกรมโรงงานอุตสาหกรรม



ที่ อก ๐๓๑๐(๑)/ ๑๑ ๐๑ ๖

กรมโรงงานอุตสาหกรรม  
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท  
เขตราชเทวี กรุงเทพฯ ๑๐๔๐๐

๒ ๐ กรกฎาคม ๒๕๖๖

เรื่อง ต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

เรียน กรรมการผู้จัดการ บริษัท ซีคอต จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกชน  
ลงวันที่ ๗ เมษายน ๒๕๖๖

สิ่งที่ส่งมาด้วย ๑. รายชื่อผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์ จำนวน ๑ แผ่น  
๒. รายชื่อเจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๑ แผ่น  
๓. ขอบข่ายสารมลพิษที่ได้รับขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๓๙ แผ่น  
ตามหนังสือที่อ้างถึง บริษัท ซีคอต จำกัด ขอต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ๖-๒๓๙ สถานที่ตั้งเลขที่ ๒๓๙ ถนนริมคลองประปา แขวงบางซื่อ เขตบางซื่อ กรุงเทพมหานคร ต่อกรมโรงงานอุตสาหกรรม นั้น  
กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้บริษัท ซีคอต จำกัด ต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน โดยมีองค์ประกอบดังนี้  
ก. ผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์ จำนวน ๑๐ ราย ตามสิ่งที่ส่งมาด้วย ๑  
ข. เจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๓๘ ราย ตามสิ่งที่ส่งมาด้วย ๒  
ค. ขอบข่ายสารมลพิษที่ได้รับขึ้นทะเบียนให้วิเคราะห์ในน้ำเสีย น้ำใต้ดิน อากาศเสีย สิ่งปฏิกูล หรือวัสดุที่ไม่ใช้แล้ว และดิน ตามสิ่งที่ส่งมาด้วย ๓

หนังสือฉบับนี้จะหมดอายุในวันที่ ๒ พฤษภาคม ๒๕๖๙ หากประสงค์จะต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน ให้ยื่นคำขอต่ออายุพร้อมเอกสารประกอบคำขอต่อกรมโรงงานอุตสาหกรรมภายใน ๓๐ วัน ก่อนวันสิ้นอายุของหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน ซึ่งคำขอต่ออายุดังกล่าวขอรับได้ที่กรมโรงงานอุตสาหกรรม ทั้งนี้ สามารถยื่นคำขอผ่านระบบอิเล็กทรอนิกส์ได้ที่หน้าเว็บไซต์กรมโรงงานอุตสาหกรรม

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

(นายประสม ดำรงพงษ์)

กองวิจัยและเตือนภัยมลพิษโรงงาน ผู้อำนวยการกองวิจัยและเตือนภัยมลพิษโรงงาน  
ปฏิบัติราชการแทนอธิบดีกรมโรงงานอุตสาหกรรม  
กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษและทะเบียนห้องปฏิบัติการ

โทร. ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๐๓-๕

โทรสาร ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๔๙

ไปรษณีย์อิเล็กทรอนิกส์ saraban@diw.mail.go.th



“อุตสาหกรรมก้าวไกล ประเทศไทยก้าวหน้า ร่วมกันพัฒนา อุตสาหกรรมสีเขียว”



สิ่งที่ส่งมาด้วย ๑

เอกสารแนบท้ายหนังสือรับต่ออายุขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

บริษัท ซีคอต จำกัด

เลขทะเบียน ๖-๒๓๙

ที่ อก ๐๓๑๐(๑)/ ๑๑ ๐๑ ๖

ลงวันที่ ๒ ๐ กรกฎาคม ๒๕๖๖

ก. ผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์ จำนวน ๑๐ ราย

๑) นายชรรชัย เกรียงไกรอุดม	ทะเบียนเลขที่ ๖-๒๓๙-ค-๐๐๐๒
๒) นางสมฤดี เกรียงไกรอุดม	ทะเบียนเลขที่ ๖-๒๓๙-ค-๐๐๐๓
๓) นางสาวรยา ทิพรักษ์	ทะเบียนเลขที่ ๖-๒๓๙-ค-๐๐๐๔
๔) นางสาวชมชุติน อินทร์ศรี	ทะเบียนเลขที่ ๖-๒๓๙-ค-๐๐๐๕
๕) นางสาวปรีดา สมใจ	ทะเบียนเลขที่ ๖-๒๓๙-ค-๐๐๐๖
๖) นางสาวอริยญา มาตา	ทะเบียนเลขที่ ๖-๒๓๙-ค-๐๐๐๗
๗) นางสาวลดาวัลย์ วงศ์เจริญ	ทะเบียนเลขที่ ๖-๒๓๙-ค-๐๐๐๘
๘) นางสาวณัฏฐา เกตวันดี	ทะเบียนเลขที่ ๖-๒๓๙-ค-๐๐๐๙
๙) นางสาวนริสา ภูวสรเพ็ญ	ทะเบียนเลขที่ ๖-๒๓๙-ค-๐๐๑๐
๑๐) นางสาวศิริวรรณ ฉิมสง่า	ทะเบียนเลขที่ ๖-๒๓๙-ค-๐๐๑๑

เอกสารแนบท้ายหนังสือรับต่ออายุขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

บริษัท ซีคอฟ จำกัด

เลขทะเบียน ๖-๒๓๙

ที่ ออก ๐๓๑๐(๑)/ ๑๑ ๐ ๑ ๖

ลงวันที่ ๒๐ กรกฎาคม ๒๕๖๖

ข. เจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๓๘ ราย

๑) นางสาวสุดาพร สุนทร	ทะเบียนเลขที่ ๖-๒๓๙-จ-๐๐๐๑
๒) นางสาวสุรชาติทิพย์ เทียนเดี่ยว	ทะเบียนเลขที่ ๖-๒๓๙-จ-๐๐๐๓
๓) นางสาวสุนันทา ศิริคุณานนท์	ทะเบียนเลขที่ ๖-๒๓๙-จ-๐๐๐๔
๔) นายบวร ดีชัยยะ	ทะเบียนเลขที่ ๖-๒๓๙-จ-๐๐๐๕
๕) นางสาวเกศรินทร์ วรเดชวิทยา	ทะเบียนเลขที่ ๖-๒๓๙-จ-๐๐๐๖
๖) นายอนันต์ ภูมิวันนา	ทะเบียนเลขที่ ๖-๒๓๙-จ-๐๐๐๗
๗) นายชิตพล สมประสงค์	ทะเบียนเลขที่ ๖-๒๓๙-จ-๐๐๐๘
๘) นางสาวศศิธร พรหมประเสริฐ	ทะเบียนเลขที่ ๖-๒๓๙-จ-๐๐๐๙
๙) นายศิวนนท์ กุลวงษ์	ทะเบียนเลขที่ ๖-๒๓๙-จ-๐๐๑๐
๑๐) นางสาวอลิษา คณิธรานนท์	ทะเบียนเลขที่ ๖-๒๓๙-จ-๐๐๑๑
๑๑) นางสาวสิริวรรณ แก้วชิงดวง	ทะเบียนเลขที่ ๖-๒๓๙-จ-๐๐๑๒
๑๒) นางสาวปัทมวรรณ สุวรรณวิโรจน์	ทะเบียนเลขที่ ๖-๒๓๙-จ-๐๐๑๓
๑๓) นางสาวกนิษฐา เจริญเชื้อ	ทะเบียนเลขที่ ๖-๒๓๙-จ-๐๐๑๔
๑๔) นายวัชรกานต์ ประมาคเต	ทะเบียนเลขที่ ๖-๒๓๙-จ-๐๐๑๕
๑๕) นายชอง เสงฆ์กุล	ทะเบียนเลขที่ ๖-๒๓๙-จ-๐๐๑๖
๑๖) นางสาวกฤษณา จันทุม	ทะเบียนเลขที่ ๖-๒๓๙-จ-๐๐๑๗
๑๗) นางสาวพรนภา บุตรธรรม	ทะเบียนเลขที่ ๖-๒๓๙-จ-๐๐๑๘
๑๘) นางสาวธารินี อาจปลิว	ทะเบียนเลขที่ ๖-๒๓๙-จ-๐๐๑๙
๑๙) นายธนโชติ ช่างล้อ	ทะเบียนเลขที่ ๖-๒๓๙-จ-๐๐๒๐
๒๐) นางสาวพัชรา สมานอันท์	ทะเบียนเลขที่ ๖-๒๓๙-จ-๐๐๒๑
๒๑) นางสาวจุฑารัตน์ แจ่มเรือน	ทะเบียนเลขที่ ๖-๒๓๙-จ-๐๐๒๒
๒๒) นางสาวจณิสตา กุ้ยอ่อน	ทะเบียนเลขที่ ๖-๒๓๙-จ-๐๐๒๓
๒๓) นายกิตติพงศ์ ตะเกียงสุข	ทะเบียนเลขที่ ๖-๒๓๙-จ-๐๐๒๔
๒๔) นายจิรวัฒน์ โคตรคำหาญ	ทะเบียนเลขที่ ๖-๒๓๙-จ-๐๐๒๕
๒๕) นายชนะพล อัครผล	ทะเบียนเลขที่ ๖-๒๓๙-จ-๐๐๒๖
๒๖) นางสาวทิพย์สุดา วรรณการ	ทะเบียนเลขที่ ๖-๒๓๙-จ-๐๐๒๗
๒๗) นายสิทธิชัย สว่างวงศ์ไชย	ทะเบียนเลขที่ ๖-๒๓๙-จ-๐๐๒๘
๒๘) นายพิษณุ สีนามเพ็ง	ทะเบียนเลขที่ ๖-๒๓๙-จ-๐๐๒๙
๒๙) นายรัตนชัย ชอบทำกิจ	ทะเบียนเลขที่ ๖-๒๓๙-จ-๐๐๓๐
๓๐) นายธนาวุฒิ ศวันแสง	ทะเบียนเลขที่ ๖-๒๓๙-จ-๐๐๓๑
๓๑) นายณัฐชัย ไชยโคตร	ทะเบียนเลขที่ ๖-๒๓๙-จ-๐๐๓๒
๓๒) นายณัฐดนัย กฤษณะโสม	ทะเบียนเลขที่ ๖-๒๓๙-จ-๐๐๓๓
๓๓) นายศุภชัย สุขใหม่	ทะเบียนเลขที่ ๖-๒๓๙-จ-๐๐๓๔
๓๔) นายรอมฎอน เทลิ้มหมาด	ทะเบียนเลขที่ ๖-๒๓๙-จ-๐๐๓๕
๓๕) นางสาวสุภาวดี บัวแก้ว	ทะเบียนเลขที่ ๖-๒๓๙-จ-๐๐๓๖
๓๖) นางสาวมาลีอาณี ฮาแว	ทะเบียนเลขที่ ๖-๒๓๙-จ-๐๐๓๗
๓๗) นางสาววิระยา ปังฉิมบุรณ์	ทะเบียนเลขที่ ๖-๒๓๙-จ-๐๐๓๘
๓๘) นางสาวศลิษา อินทรีย์	ทะเบียนเลขที่ ๖-๒๓๙-จ-๐๐๓๙

31/7/2566

เอกสารแนบท้ายหนังสือรับต่ออายุขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

บริษัท ซีคอฟ จำกัด

เลขทะเบียน ๖-๒๓๙

ที่ ออก ๐๓๑๐(๑)/ ๑๑ ๐ ๑ ๖

ลงวันที่ ๒๐ กรกฎาคม ๒๕๖๖

ขอขยายสารมลพิษที่ได้รับขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๓๕๕ รายการ

น้ำเสีย จำนวน 45 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Aldrin	1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(4)</sup>
2	Arsenic	2) Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup> 1) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method <sup>(4)</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>(4)</sup>
3	Barium	1) Digestion, Direct Nitrous Oxide-Acetylene Flame Method <sup>(4)</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>(4)</sup>
4	α-BHC	1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(4)</sup> 2) Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
5	β-BHC	1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(4)</sup> 2) Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
6	δ-BHC	1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(4)</sup> 2) Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
7	γ-BHC	1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(4)</sup> 2) Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>

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ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
8	Biochemical Oxygen Demand	1) 5-Day BOD Test, Azide Modification Method <sup>[4]</sup> 2) 5-Day BOD Test, Membrane Electrode Method <sup>[4]</sup>
9	Cadmium	1) Digestion, Direct Air-Acetylene Flame Method <sup>[4]</sup> 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method <sup>[4]</sup> 3) Digestion, Inductively Coupled Plasma Method <sup>[4]</sup>
10	Chemical Oxygen Demand	1) Open Reflux, Titrimetric method <sup>[4]</sup> 2) Closed Reflux, Colorimetric method <sup>[4]</sup> 3) Closed Reflux, Titrimetric Method <sup>[4]</sup>
11	Chlordane	1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup> 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
12	Chromium	1) Digestion, Direct Air-Acetylene Flame Method <sup>[4]</sup> 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method <sup>[4]</sup> 3) Digestion, Inductively Coupled Plasma Method <sup>[4]</sup>
13	Color	ADMI Weighted-Ordinate Spectrophotometric Method <sup>[4]</sup>
14	Copper	1) Digestion, Direct Air-Acetylene Flame Method <sup>[4]</sup> 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method <sup>[4]</sup> 3) Digestion, Inductively Coupled Plasma Method <sup>[4]</sup>
15	Cyanide	Distillation, Colorimetric method <sup>[4]</sup>
16	4,4'-DDD	1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup> 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
17	4,4'-DDE	1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup> 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
18	4,4'-DDT	1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup> 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
19	Dieldrin	1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup> 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
20	Endosulfan I	1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup> 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
21	Endosulfan II	1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup> 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
22	Endosulfan Sulfate	1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup> 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
23	Endrin	1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup> 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
24	Endrin Aldehyde	1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup> 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
25	Formaldehyde	Distillation, Colorimetric Method <sup>[3]</sup>
26	Free Chlorine	1) Iodometric Method <sup>[4]</sup> 2) DPD Colorimetric Method <sup>[4]</sup>
27	Heptachlor	1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup> 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass-Spectrometric Method <sup>[4]</sup>
28	Heptachlor epoxide	1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup> 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
29	Hexavalent Chromium	1) Colorimetric Method <sup>[4]</sup> 2) Extraction, Air-Acetylene Flame Method <sup>[4]</sup>
30	Lead	1) Digestion, Direct Air-Acetylene Flame Method <sup>[4]</sup> 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method <sup>[4]</sup> 3) Digestion, Inductively Coupled Plasma Method <sup>[4]</sup>
31	Manganese	1) Digestion, Direct Air-Acetylene Flame Method <sup>[4]</sup> 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method <sup>[4]</sup> 3) Digestion, Inductively Coupled Plasma Method <sup>[4]</sup>
32	Mercury	Digestion, Cold-Vapor Atomic Absorption Spectrometric Method <sup>[4]</sup>
33	Methoxychlor	1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup> 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
34	Nickel	1) Digestion, Direct Air-Acetylene Flame Method <sup>[4]</sup> 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method <sup>[4]</sup> 3) Digestion...

3) Digestion...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
		3) Digestion, Inductively Coupled Plasma Method <sup>[4]</sup>
35	Oil & Grease	1) Liquid-Liquid, Partition-Gravimetric Method <sup>[4]</sup> 2) Soxhlet Extraction Method <sup>[4]</sup>
36	pH	Electrometric Method <sup>[4]</sup>
37	Phenols	1) Distillation, Chloroform Extraction Method <sup>[4]</sup> 2) Distillation, Direct Photometric Method <sup>[4]</sup>
38	Selenium	1) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method <sup>[4]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[4]</sup>
39	Sulfide	1) Iodometric method <sup>[4]</sup> 2) Methylene blue method <sup>[4]</sup>
40	Temperature	Laboratory and Field Methods <sup>[4]</sup>
41	Total Dissolved Solids	Dried at 180 °C <sup>[4]</sup>
42	Total Kjeldahl Nitrogen	1) Macro Kjeldahl Method <sup>[4]</sup> 2) Semi-Micro Kjeldahl Method <sup>[4]</sup>
43	Total Suspended Solids	Dried at 103-105 °C <sup>[4]</sup>
44	Trivalent Chromium	1) Digestion, Direct Air-Acetylene Flame Method; Colorimetric Method; Calculation <sup>[4]</sup> 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method; Colorimetric Method; Calculation <sup>[4]</sup> 3) Digestion, Inductively Coupled Plasma Method; Colorimetric Method; Calculation <sup>[4]</sup>
45	Zinc	1) Digestion, Direct Air-Acetylene Flame Method <sup>[4]</sup> 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method <sup>[4]</sup> 3) Digestion, Inductively Coupled Plasma Method <sup>[4]</sup> 3) Digestion...

น้ำใต้ดิน...


น้ำใต้ดิน จำนวน 125 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Acenaphthene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
2	Acetone	Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
3	Aldrin	1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup> 2) Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
4	Anthracene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
5	Antimony	Digestion, Inductively Coupled Plasma Spectrometric Method <sup>[4]</sup>
6	Arsenic	1) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method <sup>[4]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[4]</sup>
7	Atrazine	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup>
8	Barium	1) Digestion, Direct Nitrous Oxide-Acetylene Flame Method <sup>[4]</sup> 2) Digestion, Inductively Coupled Plasma Spectrometric Method <sup>[4]</sup>
9	Benz(a)anthracene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
10	Benzene	Purge and Trap Gas Chromatographic/Mass spectrometric Method <sup>[4]</sup>
11	Benzo(b)fluoranthene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
12	Benzo(k)fluoranthene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup> 3mg/l


ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
13	Benzoic acid	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
14	Benzo(a)pyrene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
15	Benzo(g,h,i)perylene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
16	Beryllium	Digestion, Inductively Coupled Plasma Spectrometric Method <sup>[4]</sup>
17	Bis(2-chloroethyl)ether	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
18	Bis(2-ethylhexyl)phthalate	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
19	Bromodichloromethane	Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
20	Bromoform	Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
21	Butanol	Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
22	Butyl benzyl phthalate	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
23	Cadmium	1) Digestion, Direct Air-Acetylene Flame Method <sup>[4]</sup> 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method <sup>[4]</sup> 3) Digestion, Inductively Coupled Plasma Spectrometric Method <sup>[4]</sup>
24	Carbazole	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
25	Carbon disulfide	Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
26	Carbon tetrachloride	Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup> 3mg/l

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
27	Chlordane	1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(4)</sup> 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(4)</sup>
28	p-Chloroaniline	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(4)</sup>
29	Chlorobenzene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>(4)</sup>
30	Chlorodibromomethane	Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>(4)</sup>
31	Chloroform	Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>(4)</sup>
32	2-Chlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(4)</sup>
33	Chromium	1) Digestion, Direct Air-Acetylene Flame Method <sup>(4)</sup> 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method <sup>(4)</sup> 3) Digestion, Inductively Coupled Plasma Spectrometric Method <sup>(4)</sup>
34	Chromium (III)	1) Digestion, Direct Air-Acetylene Flame Method; Colorimetric Method; Calculation <sup>(4)</sup> 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method; Colorimetric Method; Calculation <sup>(4)</sup> 3) Digestion, Inductively Coupled Plasma Spectrometric Method; Colorimetric Method; Calculation <sup>(4)</sup>
35	Chromium (VI)	1) Colorimetric Method <sup>(4)</sup> 2) Extraction, Air-Acetylene Flame Method <sup>(4)</sup>
36	Chrysene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(4)</sup> <i>สมย</i>

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
37	Cyanide	1) Distillation, Titrimetric Method <sup>(4)</sup> 2) Distillation, Colorimetric Method <sup>(4)</sup>
38	2,4-D	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(4)</sup>
39	DDD	1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(4)</sup> 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(4)</sup>
40	DDE	1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(4)</sup> 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(4)</sup>
41	DDT	1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(4)</sup> 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(4)</sup>
42	Dibenz(a,h)anthracene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(4)</sup>
43	Di-n-butyl phthalate	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(4)</sup>
44	1,2-Dichlorobenzene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>(4)</sup>
45	1,3-Dichlorobenzene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>(4)</sup>
46	1,4-Dichlorobenzene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>(4)</sup>
47	3,3'-Dichlorobenzidine	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(4)</sup>
48	1,1-Dichloroethane	Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>(4)</sup>
49	1,2-Dichloroethane	Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>(4)</sup> <i>สมย</i>

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
50	1,1-Dichloroethylene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
51	cis-1,2-Dichloroethylene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
52	trans-1,2-Dichloroethylene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
53	2,4-Dichlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
54	1,2-Dichloropropane	Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
55	1,3-Dichloropropane	Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
56	1,3-Dichloropropene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
57	Dieldrin	1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup> 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
58	Diethyl phthalate	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
59	2,4-Dimethylphenol	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
60	2,4-Dinitrophenol	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
61	2,4-Dinitrotoluene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
62	2,6-Dinitrotoluene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
63	Di-n-Octyl phthalate	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
64	Endosulfan	1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup> 

2) Liquid-Liquid...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
65	Endrin	2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup> 1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup>
66	Ethylbenzene	2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup> Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
67	Fluoranthene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
68	Fluorene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
69	Heptachlor	1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup> 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
70	Heptachlor epoxide	1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup> 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
71	Hexachlorobenzene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
72	Hexachloro-1,3-butadiene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
73	n-Hexane	Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
74	α-HCH	1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup> 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
75	β-HCH	1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup> 

2) Liquid-Liquid...



ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
76	γ-HCH	2) Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup> 1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup> 2) Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
77	Hexachlorocyclopentadiene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
78	Hexachloroethane	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
79	Indeno(1,2,3-cd)pyrene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
80	Isophorone	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
81	Lead	1) Digestion, Direct Air-Acetylene Flame Method <sup>[4]</sup> 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method <sup>[4]</sup> 3) Digestion, Inductively Coupled Plasma Spectrometric Method <sup>[4]</sup>
82	Manganese	1) Digestion, Direct Air-Acetylene Flame Method <sup>[4]</sup> 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method <sup>[4]</sup> 3) Digestion, Inductively Coupled Plasma Spectrometric Method <sup>[4]</sup>
83	Mercury	Digestion, Cold-Vapor Atomic Absorption Spectrometric Method <sup>[4]</sup>
84	Methanol	Purge and Trap Gas Chromatographic/ Mass spectrometric Method <sup>[4]</sup>
85	Methoxychlor	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup>
86	Methyl bromide	Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>

87 Methylene chloride...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
87	Methylene chloride	Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
88	2-Methylphenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
89	2-Methylnaphthalene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
90	Methyl tert-butyl ether	Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
91	Naphthalene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
92	Nickel	1) Digestion, Direct Air-Acetylene Flame Method <sup>[4]</sup> 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method <sup>[4]</sup> 3) Digestion, Inductively Coupled Plasma Spectrometric Method <sup>[4]</sup>
93	Nitrobenzene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
94	N-Nitrosodiphenylamine	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
95	N-Nitrosodi-n-propylamine	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
96	Polychlorinated Biphenyls - PCB-1016 - PCB-1221 - PCB-1232 - PCB-1242 - PCB-1248 - PCB-1254 - PCB-1260	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup>
97	Pentachlorophenol	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup>
98	pH	Electrometric method <sup>[4]</sup>

99 Phenanthrene...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
99	Phenanthrene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
100	Phenol	1) Distillation, Chloroform Extraction Method <sup>[4]</sup> 2) Distillation, Direct Photometric Method <sup>[4]</sup> 3) Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
101	Pyrene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
102	Selenium	1) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method <sup>[4]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[4]</sup>
103	Silver	1) Digestion, Direct Air-Acetylene Flame Method <sup>[4]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[4]</sup>
104	Styrene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
105	1,1,2,2-Tetrachloroethane	Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
106	Tetrachloroethylene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
107	Toluene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
108	TPH (C <sub>5</sub> -C <sub>8</sub> )	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[12,25]</sup>
109	TPH (C <sub>8</sub> -C <sub>16</sub> )	1) Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[9,21]</sup> 2) Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass spectrometric Method <sup>[9,25]</sup>
110	TPH (C <sub>16</sub> -C <sub>35</sub> )	1) Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[9,21]</sup> 3m

2) Separatory...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
		2) Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass spectrometric Method <sup>[9,25]</sup>
111	1,2,4-Trichlorobenzene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
112	1,1,1-Trichloroethane	Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
113	1,1,2-Trichloroethane	Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
114	Trichloroethylene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
115	2,4,5-Trichlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
116	2,4,6-Trichlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
117	1,3,5-Trimethylbenzene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
118	Vanadium	Digestion, Inductively Coupled Plasma Spectrometric Method <sup>[4]</sup>
119	Vinyl acetate	Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
120	Vinyl chloride	Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
121	m-Xylene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
122	o-Xylene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
123	p-Xylene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
124	Xylene (Total)	Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup> 3m

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
125	Zinc	1) Digestion, Direct Air-Acetylene Flame Method <sup>[4]</sup> 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method <sup>[4]</sup> 3) Digestion, Inductively Coupled Plasma Spectrometric Method <sup>[4]</sup>

อากาศเสีย (ปล่อยระบาย) จำนวน 27 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Antimony	1) Isokinetic Sampling, Digestion, Direct Air-Acetylene Flame Method <sup>[5]</sup> 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method <sup>[5]</sup>
2	Arsenic	1) Isokinetic Sampling, Digestion, Hydride Generation/Atomic Absorption Spectrometric Method <sup>[5]</sup> 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method <sup>[5]</sup>
3	Beryllium	Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method <sup>[5]</sup>
4	Cadmium	1) Isokinetic Sampling, Digestion, Direct Air-Acetylene Flame Method <sup>[5]</sup> 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method <sup>[5]</sup>
5	Carbon monoxide	Instrumental Analyzer Method <sup>[5]</sup>
6	Chlorine	1) Absorption Sampling, Ion Chromatographic Method <sup>[5]</sup> 2) Isokinetic Sampling, Ion Chromatographic Method <sup>[5]</sup>
7	Chromium	1) Isokinetic Sampling, Digestion, Direct Air-Acetylene Flame Method <sup>[5]</sup> 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method <sup>[5]</sup> <i>สมพงษ์</i>

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
8	Cobalt	Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method <sup>[5]</sup>
9	Copper	1) Isokinetic Sampling, Digestion, Direct Air-Acetylene Flame Method <sup>[5]</sup> 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method <sup>[5]</sup>
10	Cresol	Adsorption Sampling, Gas Chromatographic Method <sup>[5]</sup>
11	Dioxin/Furans	Isokinetic Sampling <sup>[5]</sup>
12	Hydrogen chloride	1) Absorption Sampling, Ion Chromatographic Method <sup>[5]</sup> 2) Isokinetic Sampling, Ion Chromatographic Method <sup>[5]</sup>
13	Hydrogen Fluoride	1) Absorption Sampling, Ion Chromatographic Method <sup>[5]</sup> 2) Isokinetic Sampling, Ion Chromatographic Method <sup>[5]</sup>
14	Hydrogen Sulfide	Absorption Sampling, Iodometric Method <sup>[5]</sup>
15	Lead	1) Isokinetic Sampling, Digestion, Direct Air-Acetylene Flame Method <sup>[5]</sup> 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method <sup>[5]</sup>
16	Manganese	1) Isokinetic Sampling, Digestion, Direct Air-Acetylene Flame Method <sup>[5]</sup> 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method <sup>[5]</sup>
17	Mercury	Isokinetic Sampling, Digestion, Cold-Vapor Atomic Absorption Spectrometric Method <sup>[5]</sup>
18	Nickel	1) Isokinetic Sampling, Digestion, Direct Air-Acetylene Flame Method <sup>[5]</sup> 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method <sup>[5]</sup> <i>สมพงษ์</i>

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
19	Opacity	Ringelmann's Method <sup>[2]</sup>
20	Oxides of Nitrogen	1) Absorption Sampling, Phenoldisulfonic acid Method <sup>[5]</sup> 2) Absorption Sampling, Ion Chromatographic Method <sup>[5]</sup> 3) Instrumental Analyzer Method <sup>[5]</sup>
21	Selenium	1) Isokinetic Sampling, Digestion, Hydride Generation/Atomic Absorption Spectrometric Method <sup>[5]</sup> 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method <sup>[5]</sup>
22	Sulfur dioxide	1) Isokinetic Sampling, Barium-Thorin Titrimetric Method <sup>[5]</sup> 2) Absorption Sampling, Barium-Thorin Titrimetric Method <sup>[5]</sup> 3) Instrumental Analyzer Method <sup>[5]</sup>
23	Sulfuric acid	Isokinetic Sampling, Barium-Thorin Titrimetric Method <sup>[5]</sup>
24	Tin	Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method <sup>[5]</sup>
25	Total Suspended Particulate	1) Isokinetic Sampling, Gravimetric Method <sup>[5]</sup> 2) Paired Train, Isokinetic Sampling, Gravimetric Method <sup>[5]</sup>
26	Vanadium	Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method <sup>[5]</sup>
27	Xylene	1) Adsorption Sampling, Gas Chromatographic Method <sup>[5]</sup> 2) Adsorption Sampling, Gas Chromatographic/Mass Spectrometric Method <sup>[5]</sup>

สิ่งปฏิกูล...

## สิ่งปฏิกูลหรือวัสดุที่ไม่ใช้แล้ว จำนวน 34 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Aldrin	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[1,6,9,22]</sup> 2) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[1,6,9,27]</sup> 3) Soxhlet Extraction, Gas Chromatographic Method <sup>[10,22]</sup> 4) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[10,27]</sup>
2	Antimony	1) Waste Extraction, Digestion, Hydride Generation/Atomic Absorption Spectrometric Method <sup>[1,6,16]</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[1,6,14]</sup> 3) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method <sup>[7,16]</sup> 4) Digestion, Inductively Coupled Plasma Method <sup>[7,14]</sup>
3	Arsenic	1) Waste Extraction, Digestion, Hydride Generation/Atomic Absorption Spectrometric Method <sup>[1,6,16]</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[1,6,14]</sup> 3) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method <sup>[7,16]</sup> 4) Digestion, Inductively Coupled Plasma Method <sup>[7,14]</sup>
4	Barium	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method <sup>[1,6,15]</sup>

2) Waste Extraction...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
5	Beryllium	2) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[1,6,14]</sup> 3) Digestion, Flame Atomic Absorption Spectrometric Method <sup>[7,15]</sup> 4) Digestion, Inductively Coupled Plasma Method <sup>[7,14]</sup>
6	Cadmium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[1,6,14]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[7,14]</sup>
7	Chlordane	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method <sup>[1,6,15]</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[1,6,14]</sup> 3) Digestion, Flame Atomic Absorption Spectrometric Method <sup>[7,15]</sup> 4) Digestion, Inductively Coupled Plasma Method <sup>[7,14]</sup>
8	Chromium	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[1,9,22]</sup> 2) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[1,9,27]</sup> 3) Soxhlet Extraction, Gas Chromatographic Method <sup>[10,22]</sup> 4) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[10,27]</sup>
		1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method <sup>[1,6,15]</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[1,6,14]</sup> <i>3) Digestion...</i>

3) Digestion...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
9	Chromium (III)	3) Digestion, Flame Atomic Absorption Spectrometric Method <sup>[7,15]</sup> 4) Digestion, Inductively Coupled Plasma Method <sup>[7,14]</sup> 1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method; Waste Extraction, Colorimetric Method; Calculation <sup>[1,6,15,17]</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma Method; Waste Extraction, Colorimetric Method; Calculation <sup>[1,6,14,17]</sup> 3) Digestion, Flame Atomic Absorption Spectrometric Method; Alkaline Digestion, Colorimetric Method; Calculation <sup>[7,8,15,17]</sup> 4) Digestion, Inductively Coupled Plasma Method; Alkaline Digestion, Colorimetric Method; Calculation <sup>[7,8,14,17]</sup>
10	Chromium (VI)	1) Waste Extraction, Colorimetric Method <sup>[1,17]</sup> 2) Alkaline Digestion, Colorimetric Method <sup>[8,17]</sup>
11	Cobalt	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[1,6,14]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[7,14]</sup>
12	Copper	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method <sup>[1,6,15]</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[1,6,14]</sup> 3) Digestion, Flame Atomic Absorption Spectrometric Method <sup>[7,15]</sup> 4) Digestion, Inductively Coupled Plasma Method <sup>[7,14]</sup> <i>3) Digestion...</i>

13 2,4-D...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
13	2,4-D	1) Waste Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[1,25]</sup> 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[25]</sup>
14	DDD	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[1,9,22]</sup> 2) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[1,9,27]</sup> 3) Soxhlet Extraction, Gas Chromatographic Method <sup>[10,22]</sup> 4) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[10,27]</sup>
15	DDE	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[1,9,22]</sup> 2) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[1,9,27]</sup> 3) Soxhlet Extraction, Gas Chromatographic Method <sup>[10,22]</sup> 4) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[10,27]</sup>
16	DDT	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[1,9,22]</sup> 2) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[1,9,27]</sup> 3) Soxhlet Extraction, Gas Chromatographic Method <sup>[10,22]</sup> 4) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[10,27]</sup>

17 Dieldrin...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
17	Dieldrin	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[1,9,22]</sup> 2) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[1,9,27]</sup> 3) Soxhlet Extraction, Gas Chromatographic Method <sup>[10,22]</sup> 4) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[10,27]</sup>
18	Endrin	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[1,9,22]</sup> 2) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[1,9,27]</sup> 3) Soxhlet Extraction, Gas Chromatographic Method <sup>[10,22]</sup> 4) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[10,27]</sup>
19	Heptachlor	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[1,9,22]</sup> 2) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[1,9,27]</sup> 3) Soxhlet Extraction, Gas Chromatographic Method <sup>[10,22]</sup> 4) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[10,27]</sup>
20	Lead	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method <sup>[1,6,15]</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[1,6,14]</sup>

3) Digestion...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
21	Lindane	3) Digestion, Flame Atomic Absorption Spectrometric Method <sup>[7,15]</sup> 4) Digestion, Inductively Coupled Plasma Method <sup>[7,14]</sup> 1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[1,9,22]</sup> 2) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[1,9,27]</sup> 3) Soxhlet Extraction, Gas Chromatographic Method <sup>[10,22]</sup> 4) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[10,27]</sup>
22	Mercury	1) Waste Extraction, Digestion, Cold-Vapor Atomic Absorption Spectrometric Method <sup>[1,18]</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[1,6,14]</sup> 3) Digestion, Cold-Vapor Atomic Absorption Spectrometric Method <sup>[19]</sup> 4) Digestion, Inductively Coupled Plasma Method <sup>[7,14]</sup>
23	Methoxychlor	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[1,9,22]</sup> 2) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[1,9,27]</sup> 3) Soxhlet Extraction, Gas Chromatographic Method <sup>[10,22]</sup> 4) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[10,27]</sup>


24 Molybdenum...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
24	Molybdenum	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[1,6,14]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[7,14]</sup>
25	Nickel	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method <sup>[1,6,15]</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[1,6,14]</sup> 3) Digestion, Flame Atomic Absorption Spectrometric Method <sup>[7,15]</sup> 4) Digestion, Inductively Coupled Plasma Method <sup>[7,14]</sup>
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 <sup>[1,9,23]</sup> 2) Soxhlet Extraction, Gas Chromatographic Method <sup>[10,23]</sup>
27	Pentachlorophenol	1) Waste Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[1,25]</sup> 2) Ultrasonic Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[25]</sup>
28	pH	Electrometric Method <sup>[31,32]</sup>
29	Selenium	1) Waste Extraction, Digestion, Hydride Generation/Atomic Absorption Spectrometric Method <sup>[1,6,20]</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[1,6,14]</sup> 3) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method <sup>[7,20]</sup>


4) Digestion...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
30	Silver	4) Digestion, Inductively Coupled Plasma Method <sup>[7,14]</sup> 1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[1,6,14]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[7,14]</sup>
31	Thallium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[1,6,14]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[7,14]</sup>
32	Trichloroethylene	1) Waste Extraction, Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[1,12,26]</sup> 2) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[12,26]</sup>
33	Vanadium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[1,6,14]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[7,14]</sup>
34	Zinc	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method <sup>[1,6,15]</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[1,6,14]</sup> 3) Digestion, Flame Atomic Absorption Spectrometric Method <sup>[7,15]</sup> 4) Digestion, Inductively Coupled Plasma Method <sup>[7,14]</sup>

ดิน จำนวน 124 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Acenaphthene	Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[10,27]</sup> 

2 Acetone...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
2	Acetone	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[13,26]</sup>
3	Aldrin	1) Ultrasonic Extraction, Gas Chromatographic Method <sup>[11,22]</sup> 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[11,27]</sup>
4	Anthracene	Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[10,27]</sup>
5	Antimony	1) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method <sup>[7,16]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[7,14]</sup>
6	Arsenic	1) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method <sup>[7,16]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[7,14]</sup>
7	Atrazine	Ultrasonic Extraction, Gas Chromatographic Method <sup>[11,24]</sup>
8	Barium	1) Digestion, Flame Atomic Absorption Spectrometric Method <sup>[7,15]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[7,14]</sup>
9	Benz(a)anthracene	Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[10,27]</sup>
10	Benzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[13,26]</sup>
11	Benzo(b)fluoranthene	Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[10,27]</sup>
12	Benzo(k)fluoranthene	Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[10,27]</sup>
13	Benzoic acid	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[11,27]</sup> 

14 Benzo(a)pyrene...



ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
14	Benzo(a)pyrene	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[10,27]</sup>
15	Benzo(g,h,i)perylene	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[10,27]</sup>
16	Beryllium	Digestion, Inductively Coupled Plasma Method <sup>[7,14]</sup>
17	Bis(2-chloroethyl)ether	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[10,27]</sup>
18	Bis(2-ethylhexyl)phthalate	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[10,27]</sup>
19	Bromodichloromethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>[13,26]</sup>
20	Bromoform	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>[13,26]</sup>
21	Butanol	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>[13,26]</sup>
22	Butyl benzyl phthalate	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[10,27]</sup>
23	Cadmium	1) Digestion, Flame Atomic Absorption Spectrometric Method <sup>[7,15]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[7,14]</sup>
24	Carbazole	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[10,27]</sup>
25	Carbon disulfide	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>[13,26]</sup>
26	Carbon tetrachloride	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>[13,26]</sup>
27	Chlordane	1) Ultrasonic Extraction, Gas Chromatographic Method <sup>[11,22]</sup> 2) Ultrasonic Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[11,27]</sup>

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
28	p-Chloroaniline	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[10,27]</sup>
29	Chlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>[13,26]</sup>
30	Chlorodibromomethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>[13,26]</sup>
31	Chloroform	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[13,26]</sup>
32	2-Chlorophenol	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[11,27]</sup>
33	Chromium	1) Digestion, Flame Atomic Absorption Spectrometric Method <sup>[7,15]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[7,14]</sup>
34	Chromium (III)	1) Digestion, Flame Atomic Absorption Spectrometric Method; Colorimetric Method; Calculation <sup>[7,8,15,17]</sup> 2) Digestion, Inductively Coupled Plasma Method; Colorimetric Method; Calculation <sup>[7,8,14,17]</sup>
35	Chromium (VI)	Alkaline Digestion, Colorimetric Method <sup>[8,17]</sup>
36	Chrysene	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[10,27]</sup>
37	Cyanide	1) Extraction, Distillation, Titrimetric Method <sup>[28,29,30]</sup> 2) Extraction, Distillation, Colorimetric Method <sup>[28,29,30]</sup>
38	2,4-D	Ultrasonic Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[24]</sup>
39	DDD	1) Ultrasonic Extraction, Gas Chromatographic Method <sup>[11,22]</sup> 2) Ultrasonic Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[11,27]</sup>

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
40	DDE	1) Ultrasonic Extraction, Gas Chromatographic Method <sup>(11,22)</sup> 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(11,27)</sup>
41	DDT	1) Ultrasonic Extraction, Gas Chromatographic Method <sup>(11,22)</sup> 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(11,27)</sup>
42	Dibenz(a,h)anthracene	Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,27)</sup>
43	Di-n-butyl phthalate	Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,27)</sup>
44	1,2-Dichlorobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(13,26)</sup>
45	1,3-Dichlorobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(13,26)</sup>
46	1,4-Dichlorobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(13,26)</sup>
47	3,3'-Dichlorobenzidine	Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,27)</sup>
48	1,1-Dichloroethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(13,26)</sup>
49	1,2-Dichloroethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(13,26)</sup>
50	1,1-Dichloroethylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(13,26)</sup>
51	cis-1,2-Dichloroethylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(13,26)</sup>
52	trans-1,2-Dichloroethylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(13,26)</sup>
53	2,4-Dichlorophenol	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(11,27)</sup>

54 1,2-Dichloropropane...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
54	1,2-Dichloropropane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(13,26)</sup>
55	1,3-Dichloropropane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(13,26)</sup>
56	1,3-Dichloropropene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(13,26)</sup>
57	Dieldrin	1) Ultrasonic Extraction, Gas Chromatographic Method <sup>(11,22)</sup> 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(11,27)</sup>
58	Diethyl phthalate	Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,27)</sup>
59	2,4-Dimethylphenol	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(11,27)</sup>
60	2,4-Dinitrophenol	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(11,27)</sup>
61	2,4-Dinitrotoluene	Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,27)</sup>
62	2,6-Dinitrotoluene	Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,27)</sup>
63	Di-n-Octyl phthalate	Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,27)</sup>
64	Endosulfan	1) Ultrasonic Extraction, Gas Chromatographic Method <sup>(11,22)</sup> 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(11,27)</sup>
65	Endrin	1) Ultrasonic Extraction, Gas Chromatographic Method <sup>(11,22)</sup> 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(11,27)</sup>
66	Ethylbenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(13,26)</sup>

67 Fluoranthene...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
67	Fluoranthene	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[10,27]</sup>
68	Fluorene	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[10,27]</sup>
69	Heptachlor	1) Ultrasonic Extraction, Gas Chromatographic Method <sup>[11,22]</sup> 2) Ultrasonic Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[11,27]</sup>
70	Heptachlor epoxide	1) Ultrasonic Extraction, Gas Chromatographic Method <sup>[11,22]</sup> 2) Ultrasonic Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[11,27]</sup>
71	Hexachlorobenzene	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[11,27]</sup>
72	Hexachloro-1,3-butadiene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[13,26]</sup>
73	n-Hexane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>[13,26]</sup>
74	α-HCH	1) Ultrasonic Extraction, Gas Chromatographic Method <sup>[11,22]</sup> 2) Ultrasonic Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[11,27]</sup>
75	β-HCH	1) Ultrasonic Extraction, Gas Chromatographic Method <sup>[11,22]</sup> 2) Ultrasonic Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[11,27]</sup>
76	γ-HCH	1) Ultrasonic Extraction, Gas Chromatographic Method <sup>[11,22]</sup> 2) Ultrasonic Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[11,27]</sup>
77	Hexachlorocyclopentadiene	Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[10,27]</sup>

78 Hexachloroethane...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
78	Hexachloroethane	Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[10,27]</sup>
79	Indeno(1,2,3-cd)pyrene	Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[10,27]</sup>
80	Isophorone	Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[10,27]</sup>
81	Lead	1) Digestion, Flame Atomic Absorption Spectrometric Method <sup>[7,15]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[7,14]</sup>
82	Manganese	1) Digestion, Flame Atomic Absorption Spectrometric Method <sup>[7,15]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[7,14]</sup>
83	Mercury	1) Digestion, Cold-Vapor Atomic Absorption Spectrometric Method <sup>[19]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[7,14]</sup>
84	Methanol	Ultrasonic Extraction, Direct Aqueous Injection, Gas Chromatographic Method <sup>[11,21]</sup>
85	Methoxychlor	1) Ultrasonic Extraction, Gas Chromatographic Method <sup>[11,22]</sup> 2) Ultrasonic Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[11,27]</sup>
86	Methyl bromide	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[13,26]</sup>
87	Methylene chloride	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[13,26]</sup>
88	2-Methylphenol	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[11,27]</sup>
89	2-Methylnaphthalene	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[11,27]</sup>

90 Methyl tert-butyl ether...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
90	Methyl tert-butyl ether	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[13,26]</sup>
91	Naphthalene	Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[10,27]</sup>
92	Nickel	1) Digestion, Flame Atomic Absorption Spectrometric Method <sup>[7,15]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[7,14]</sup>
93	Nitrobenzene	Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[10,27]</sup>
94	N-Nitrosodiphenylamine	Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[10,27]</sup>
95	N-Nitrosodi-n-propylamine	Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[10,27]</sup>
96	Polychlorinated Biphenyls - Aroclor 1016 - Aroclor 1221 - Aroclor 1232 - Aroclor 1242 - Aroclor 1248 - Aroclor 1254 - Aroclor 1260	Soxhlet Extraction, Gas Chromatographic Method <sup>[10,23]</sup>
97	Pentachlorophenol	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[24]</sup>
98	Phenanthrene	Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[10,27]</sup>
99	Phenol	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[11,27]</sup>
100	Pyrene	Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[10,27]</sup>
101	Selenium	1) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method <sup>[7,20]</sup>

2) Digestion...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
102	Silver	2) Digestion, Inductively Coupled Plasma Method <sup>[7,14]</sup> 1) Digestion, Flame Atomic Absorption Spectrometric Method <sup>[7,15]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[7,14]</sup>
103	Styrene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[13,26]</sup>
104	1,1,2,2-Tetrachloroethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[13,26]</sup>
105	Tetrachloroethylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[13,26]</sup>
106	Toluene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[13,26]</sup>
107	TPH (C <sub>5</sub> -C <sub>9</sub> )	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[13,26]</sup>
108	TPH (C <sub>9</sub> -C <sub>16</sub> )	1) Soxhlet Extraction, Gas Chromatographic Method <sup>[10,21]</sup> 2) Soxhlet Extraction, Gas Chromatographic/Mass spectrometric Method <sup>[10,26]</sup>
109	TPH (C <sub>16</sub> -C <sub>35</sub> )	1) Soxhlet Extraction, Gas Chromatographic Method <sup>[10,21]</sup> 2) Soxhlet Extraction, Gas Chromatographic/Mass spectrometric Method <sup>[10,26]</sup>
110	1,2,4-Trichlorobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[13,26]</sup>
111	1,1,1-Trichloroethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[13,26]</sup>
112	1,1,2-Trichloroethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[13,26]</sup>
113	Trichloroethylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[13,26]</sup>

114 2,4,5-Trichlorophenol...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
114	2,4,5-Trichlorophenol	Ultrasonic Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(11,27)</sup>
115	2,4,6-Trichlorophenol	Ultrasonic Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(11,27)</sup>
116	1,3,5-Trimethylbenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(13,26)</sup>
117	Vanadium	Digestion, Inductively Coupled Plasma Method <sup>(7,14)</sup>
118	Vinyl acetate	Purge and Trap, Gas Chromatographic/Mass spectrometric Method <sup>(13,26)</sup>
119	Vinyl chloride	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(13,26)</sup>
120	m-Xylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(13,26)</sup>
121	o-Xylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(13,26)</sup>
122	p-Xylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(13,26)</sup>
123	Xylene (Total)	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(13,26)</sup>
124	Zinc	1) Digestion, Flame Atomic Absorption Spectrometric Method <sup>(7,15)</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>(7,14)</sup> <i>ตรวจ</i>

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ภาคผนวก ฉ

ใบรับรองความสามารถห้องปฏิบัติการและขอข่ายการรับรอง  
ห้องปฏิบัติการทดสอบ ตามมาตรฐาน ISO/IEC 17025  
จากสำนักงานมาตรฐานอุตสาหกรรม (สมอ.)



แบบ กมช./สมอ.๒  
Form NSC/TISI 2

ใบรับรองเลขที่ 24-LB0026  
(Certificate No.)

## ใบรับรองระบบงาน

(Certificate of Accreditation)

อาศัยอำนาจตามความในพระราชบัญญัติการมาตรฐานแห่งชาติ พ.ศ. ๒๕๕๑  
(By Virtue of National Standardization Act B.E. 2551 (2008))

เลขาธิการสำนักงานมาตรฐานผลิตภัณฑ์อุตสาหกรรม  
(Secretary-General, Thai Industrial Standards Institute)

ออกใบรับรองฉบับนี้ให้  
(Issues this certificate to)

บริษัท ซีคอต จำกัด ฝ่ายห้องปฏิบัติการทดสอบด้านสิ่งแวดล้อม  
(Secot Company Limited, Environmental Laboratory Division)

ตั้งอยู่เลขที่  
(Address)

๒๓๙ ถนนริมคลองประปา แขวงบางซื่อ เขตบางซื่อ กรุงเทพมหานคร  
(239 Rimkongprapa Road, Bangsue, Bangsue, Bangkok)

ได้รับการรับรองความสามารถ  
(Certificate of competence)

ตามมาตรฐานเลขที่ มอก. ๑๗๐๒๕ - ๒๕๖๑  
(Standard No. TIS 17025-2561 (2018) (ISO/IEC 17025: 2017))

ข้อกำหนดทั่วไปว่าด้วยความสามารถของ ห้องปฏิบัติการทดสอบและห้องปฏิบัติการสอบเทียบ  
(General requirements for the competence of testing and calibration laboratories)

หมายเลขการรับรองที่ ทดสอบ ๐๓๙๔  
(Accreditation No. Testing 0394)

โดยมีรายละเอียดสาขาและขอบข่ายที่ได้ใบรับรอง แสดงไว้ใน QR CODE และ [www.tisi.go.th](http://www.tisi.go.th)  
(Details of the scheme and scope of the certificate are shown in QR CODE and [www.tisi.go.th](http://www.tisi.go.th))

ออกให้ ณ วันที่ ๖ ธันวาคม พ.ศ. ๒๕๖๖  
(Issue date : 6 December B.E. 2566 (2023))

  
(นายวีระศักดิ์ เพ็งหล่ง)  
(นายวีระศักดิ์ เพ็งหล่ง)

ผู้อำนวยการสำนักงานคณะกรรมการการมาตรฐานแห่งชาติ  
ปฏิบัติราชการแทน  
เลขาธิการสำนักงานมาตรฐานผลิตภัณฑ์อุตสาหกรรม



Signed by สำนักงานมาตรฐานผลิตภัณฑ์อุตสาหกรรม (สมอ.)  
Thai Industrial Standards Institute (TISI)  
Date: 2023-12-06T08:49:04.476+07:00  
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กระทรวงอุตสาหกรรม สำนักงานมาตรฐานผลิตภัณฑ์อุตสาหกรรม  
(Ministry of Industry Thailand, Thai Industrial Standards Institute)



รายละเอียดสาขาและขอบข่ายใบรับรองห้องปฏิบัติการ  
(Scope of Accreditation for Testing)  
ใบรับรองเลขที่ 24-LB0026  
(Certification No. 24-LB0026)



ชื่อห้องปฏิบัติการ  
(Laboratory Name)

หมายเลขการรับรองที่  
(Accreditation No.)

ฉบับที่ 02  
(Issue No.02)

สถานภาพห้องปฏิบัติการ  
(Laboratory status)

บริษัท ซีคอต จำกัด ฝ่ายห้องปฏิบัติการทดสอบด้านสิ่งแวดล้อม  
(Secot Company Limited, Environmental Laboratory Division)

ทดสอบ 0394  
(Testing 0394)

ออกให้ตั้งแต่วันที่ 30 ตุลาคม พ.ศ. 2566  
(Valid from) (30 October B.E.2566 (2023))

☒ถาวร (Permanent) ☐นอกสถานที่ (Site) ☐ชั่วคราว (Temporary)

ถึงวันที่ 8 กันยายน พ.ศ. 2571  
(Until) (8 September B.E.2571 (2028))

☐เคลื่อนที่ (Mobile) ☐หลายสถานที่ (Multisite)

สาขาการทดสอบ (Field of Testing)	รายการทดสอบ (Parameter)	วิธีทดสอบ (Test Method)
สาขาสสิ่งแวดล้อม (environmental field) 1. น้ำและน้ำเสีย (water and wastewater)	- โลหะหนัก (heavy metals) • สารหนู (Arsenic, As) 0.000 5 mg/L ถึง 0.090 0 mg/L  • สารหนู (Arsenic, As) 0.05 mg/L ถึง 4.50 mg/L  • แบเรียม (Barium, Ba) 0.02 mg/L ถึง 4.50 mg/L  • แคดเมียม (Cadmium, Cd) 0.01 mg/L ถึง 4.50 mg/L  • โครเมียม (Chromium, Cr) 0.01 mg/L ถึง 4.50 mg/L	- Standard Methods for the Examination of Water and Wastewater, APHA, AWWA, WEF, 23 <sup>rd</sup> edition, 2017, Part 3030 F and Part 3114 C  - Standard Methods for the Examination of Water and Wastewater, APHA, AWWA, WEF, 23 <sup>rd</sup> edition, 2017, Part 3030 E and Part 3120 B

กระทรวงอุตสาหกรรมสำนักงานมาตรฐานผลิตภัณฑ์อุตสาหกรรม  
(Ministry of Industry, Thai Industrial Standards Institute)

หน้าที่ 1/9



รายละเอียดสาขาและขอบข่ายใบรับรองห้องปฏิบัติการ

(Scope of Accreditation for Testing)

ใบรับรองเลขที่ 24-LB0026

(Certification No. 24-LB0026)



ฉบับที่ 02

(Issue No.02)

ออกให้ตั้งแต่วันที่ 30 ตุลาคม พ.ศ. 2566

(Valid from) (30 October B.E.2566 (2023))

ถึงวันที่ 8 กันยายน พ.ศ. 2571

(Until) (8 September B.E.2571 (2028))

สถานภาพห้องปฏิบัติการ  
(Laboratory status)

☒ถาวร  
(Permanent)

☐นอกสถานที่  
(Site)

☐ชั่วคราว  
(Temporary)

☐เคลื่อนที่  
(Mobile)

☐หลายสถานที่  
(Multisite)

สาขาการทดสอบ (Field of Testing)	รายการทดสอบ (Parameter)	วิธีทดสอบ (Test Method)
<p>สาขาสิ่งแวดล้อม (environmental field)</p> <p>1. น้ำและน้ำเสีย (ต่อ) (water and wastewater) (cont.)</p>	<p>- โลหะหนัก (heavy metals)</p> <ul style="list-style-type: none"> <li>ทองแดง (Copper, Cu) 0.02 mg/L ถึง 4.50 mg/L</li> <li>เหล็ก (Iron, Fe) 0.05 mg/L ถึง 9.00 mg/L</li> <li>ตะกั่ว (Lead, Pb) 0.03 mg/L ถึง 4.50 mg/L</li> <li>แมงกานีส (Manganese, Mn) 0.01 mg/L ถึง 9.00 mg/L</li> <li>นิกเกิล (Nickel, Ni) 0.01 mg/L ถึง 4.50 mg/L</li> <li>สังกะสี (Zinc, Zn) 0.02 mg/L ถึง 9.00 mg/L</li> </ul>	<p>- Standard Methods for the Examination of Water and Wastewater, APHA, AWWA, WEF, 23<sup>rd</sup> edition, 2017, Part 3030 E and Part 3120 B</p>

รายละเอียดสาขาและขอบข่ายใบรับรองห้องปฏิบัติการ

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สาขาการทดสอบ (Field of Testing)	รายการทดสอบ (Parameter)	วิธีทดสอบ (Test Method)
<p>สาขาสิ่งแวดล้อม (environmental field)</p> <p>1. น้ำและน้ำเสีย (ต่อ) (water and wastewater) (cont.)</p>	<p>- ซีโอดี (Chemical oxygen demand, COD) 100 mg/L ถึง 4 000 mg/L</p>	<p>- Standard Methods for the Examination of Water and Wastewater, APHA, AWWA, WEF, 23<sup>rd</sup> edition, 2017, Part 5220 D</p>
<p>2. บริเวณทำงาน (workplace)</p>	<p>- ฝุ่นละอองรวม (Total dust) 0.10 mg/filter ถึง 2.00 mg/filter</p> <p>- ฝุ่นละอองขนาดเล็ก (Respirable dust) 0.10 mg/filter ถึง 2.00 mg/filter</p>	<p>- NIOSH Manual of Analytical Methods (NMAM), method 0500, 4<sup>th</sup> edition, 15<sup>th</sup> August 1994 (Exclude Sampling)</p> <p>- NIOSH Manual of Analytical Methods (NMAM), method 0600, 4<sup>th</sup> edition, 15<sup>th</sup> January 1998 (Exclude Sampling)</p>

รายละเอียดสาขาและขอบข่ายใบรับรองห้องปฏิบัติการ  
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ฉบับที่ 02 (Issue No.02) ออกให้ตั้งแต่วันที่ 30 ตุลาคม พ.ศ. 2566 (Valid from (30 October B.E.2566 (2023))) ถึงวันที่ 8 กันยายน พ.ศ. 2571 (Until (8 September B.E.2571 (2028)))

สถานภาพห้องปฏิบัติการ (Laboratory status) ☒ ถาวร (Permanent) ☐ นอกสถานที่ (Site) ☐ชั่วคราว (Temporary) ☐เคลื่อนที่ (Mobile) ☐หลายสถานที่ (Multisite)

สาขาการทดสอบ (Field of Testing)	รายการทดสอบ (Parameter)	วิธีทดสอบ (Test Method)
<p>สาขาสีสิ่งแวดล้อม (environmental field)</p> <p>2. บริเวณทำงาน (ต่อ) (workplace) (cont.)</p>	<ul style="list-style-type: none"> <li>- เบนซีน (Benzene) 1.10 µg/tube ถึง 420 µg/tube</li> <li>- โทลูอีน (Toluene) 1.10 µg/tube ถึง 420 µg/tube</li> <li>- โทโทไรซีน (Total xylenes) 2.20 µg/tube ถึง 840 µg/tube</li> <li>- เมตา, พารา-ไซลีน (m, p- Xylene) 1.10 µg/tube ถึง 420 µg/tube</li> <li>- ออร์โธ-ไซลีน (o- Xylene) 1.10 µg/tube ถึง 420 µg/tube</li> </ul>	<p>- NIOSH Manual of Analytical Methods (NMAM) , method 1501, 4<sup>th</sup> edition , 15<sup>th</sup> March 2003 (Exclude Sampling)</p>
<p>3. ปล่องระบายอากาศ (stack)</p>	<ul style="list-style-type: none"> <li>- ซัลเฟอร์ไดออกไซด์ (Sulfur dioxide ) 1.00 mg/L ถึง 16 000 mg/L (solution)</li> </ul>	<p>- US.EPA , Code of Federal Regulations , 40 CFR 60 appendix A , method 6 , July 2019 (Exclude Sampling)</p>

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สาขาการทดสอบ (Field of Testing)	รายการทดสอบ (Parameter)	วิธีทดสอบ (Test Method)
<p>สาขาสีสิ่งแวดล้อม (environmental field)</p> <p>3. ปล่องระบายอากาศ (ต่อ) (stack) (cont.)</p>	<ul style="list-style-type: none"> <li>- ไฮโดรเจนฟลูออไรด์ (Hydrogen fluoride) 5 µg/sample ถึง 400 µg/sample</li> <li>- ไฮโดรเจนคลอไรด์ (Hydrogen chloride) 5 µg/sample ถึง 400 µg/sample</li> </ul>	<p>- WI-7.2-1-22 based on US.EPA , Code of Federal Regulations , 40 CFR 60 appendix A , method 26 , 2019 (Exclude Sampling)</p>

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สาขาการทดสอบ (Field of Testing)	รายการทดสอบ (Parameter)	วิธีทดสอบ (Test Method)
<p>สาขาสสิ่งแวดล้อม (environmental field)</p> <p>4. บรรยากาศทั่วไป (ambient air)</p>	<p>- สารอินทรีย์ระเหยง่าย (Volatile organic compounds, VOCs)</p> <ul style="list-style-type: none"> <li>คลอโรอีthin (Chloroethene) 0.05 <math>\mu\text{g}/\text{m}^3</math> ถึง 51.00 <math>\mu\text{g}/\text{m}^3</math> (0.02 ppbv ถึง 20.00 ppbv)</li> <li>1,3-บิวทาไดเอิน (1,3-butadiene) 0.04 <math>\mu\text{g}/\text{m}^3</math> ถึง 44.00 <math>\mu\text{g}/\text{m}^3</math> (0.02 ppbv ถึง 20.00 ppbv)</li> <li>โบรมอมีเทน (Bromomethane) 0.08 <math>\mu\text{g}/\text{m}^3</math> ถึง 77.00 <math>\mu\text{g}/\text{m}^3</math> (0.02 ppbv ถึง 20.00 ppbv)</li> <li>อะคลอลีน (Acrolein) 0.05 <math>\mu\text{g}/\text{m}^3</math> ถึง 45.00 <math>\mu\text{g}/\text{m}^3</math> (0.02 ppbv ถึง 20.00 ppbv)</li> </ul>	<p>- WI-7.2-1-24 based on US EPA , Compendium Method TO-15 , EPA/625/R-96/010b, Second edition, January 1999</p>

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สาขาการทดสอบ (Field of Testing)	รายการทดสอบ (Parameter)	วิธีทดสอบ (Test Method)
<p>สาขาสสิ่งแวดล้อม (environmental field)</p> <p>4. บรรยากาศทั่วไป (ต่อ) (ambient air) (cont.)</p>	<p>- สารอินทรีย์ระเหยง่าย (Volatile organic compounds, VOCs)</p> <ul style="list-style-type: none"> <li>อะครีโลไนไทรล์ (Acrylonitrile) 0.04 <math>\mu\text{g}/\text{m}^3</math> ถึง 43.00 <math>\mu\text{g}/\text{m}^3</math> (0.02 ppbv ถึง 20.00 ppbv)</li> <li>ไดคลอโรมีเทน (Dichloromethane) 0.14 <math>\mu\text{g}/\text{m}^3</math> to 69.00 <math>\mu\text{g}/\text{m}^3</math> (0.04 ppbv ถึง 20.00 ppbv)</li> <li>คาร์บอนไดซัลไฟด์ (Carbon disulfide) 0.06 <math>\mu\text{g}/\text{m}^3</math> ถึง 62.00 <math>\mu\text{g}/\text{m}^3</math> (0.02 ppbv ถึง 20.00 ppbv)</li> <li>ไตรคลอโรมีเทน (Trichloromethane) 0.20 <math>\mu\text{g}/\text{m}^3</math> ถึง 97.00 <math>\mu\text{g}/\text{m}^3</math> (0.04 ppbv ถึง 20.00 ppbv)</li> <li>1,2-ไดคลอโรอีเทน (1,2-dichloroethane) 0.08 <math>\mu\text{g}/\text{m}^3</math> ถึง 80.00 <math>\mu\text{g}/\text{m}^3</math> (0.02 ppbv ถึง 20.00 ppbv)</li> </ul>	<p>- WI-7.2-1-24 based on US EPA , Compendium Method TO-15 , EPA/625/R-96/010b, Second edition, January 1999</p>

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สาขาการทดสอบ (Field of Testing)	รายการทดสอบ (Parameter)	วิธีทดสอบ (Test Method)
<p>สาขาส่งแวดล้อม (environmental field)</p> <p>4. บรรยากาศทั่วไป (ต่อ) (ambient air) (cont.)</p>	<p>- สารอินทรีย์ระเหยง่าย (Volatile organic compounds, VOCs)</p> <ul style="list-style-type: none"> <li>เบนซีน (Benzene) 0.06 <math>\mu\text{g}/\text{m}^3</math> ถึง 63.00 <math>\mu\text{g}/\text{m}^3</math> (0.02 ppbv ถึง 20.00 ppbv)</li> <li>คาร์บอนเตตระคลอไรด์ (Carbon tetrachloride) 0.25 <math>\mu\text{g}/\text{m}^3</math> ถึง 125 <math>\mu\text{g}/\text{m}^3</math> (0.04 ppbv ถึง 20.00 ppbv)</li> <li>ไตรคลอโรเอทิลีน (Trichloroethylene) 0.21 <math>\mu\text{g}/\text{m}^3</math> ถึง 107 <math>\mu\text{g}/\text{m}^3</math> (0.04 ppbv ถึง 20.00 ppbv)</li> <li>1,2-ไดคลอโรโพรเพน (1,2-dichloropropane) 0.18 <math>\mu\text{g}/\text{m}^3</math> ถึง 92.00 <math>\mu\text{g}/\text{m}^3</math> (0.04 ppbv ถึง 20.00 ppbv)</li> <li>เตตระคลอโรเอทิลีน (Tetrachloroethylene) 0.27 <math>\mu\text{g}/\text{m}^3</math> ถึง 135 <math>\mu\text{g}/\text{m}^3</math> (0.04 ppbv ถึง 20.00 ppbv)</li> </ul>	<p>- WI-7.2-1-24 based on US EPA , Compendium Method TO-15 , EPA/625/R-96/010b, Second edition, January 1999</p>

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<p>สาขาส่งแวดล้อม (environmental field)</p> <p>4. บรรยากาศทั่วไป (ต่อ) (ambient air) (cont.)</p>	<p>- สารอินทรีย์ระเหยง่าย (Volatile organic compounds ,VOCs)</p> <ul style="list-style-type: none"> <li>1,2-ไดโบรมีเอเทน (1,2-dibromoethane) 0.31 <math>\mu\text{g}/\text{m}^3</math> ถึง 153 <math>\mu\text{g}/\text{m}^3</math> (0.04 ppbv ถึง 20.00 ppbv)</li> <li>1,1,2,2-เตตระคลอโรอีเทน (1,1,2,2-tetrachloroethane) 0.69 <math>\mu\text{g}/\text{m}^3</math> ถึง 137 <math>\mu\text{g}/\text{m}^3</math> (0.10 ppbv ถึง 20.00 ppbv)</li> <li>เบนซิลคลอไรด์ (Benzyl chloride) 0.52 <math>\mu\text{g}/\text{m}^3</math> ถึง 103 <math>\mu\text{g}/\text{m}^3</math> (0.10 ppbv ถึง 20.00 ppbv)</li> <li>1,4-ไดคลอโรเบนซีน (1,4-dichlorobenzene) 0.24 <math>\mu\text{g}/\text{m}^3</math> ถึง 120 <math>\mu\text{g}/\text{m}^3</math> (0.04 ppbv ถึง 20.00 ppbv)</li> </ul>	<p>- WI-7.2-1-24 based on US EPA , Compendium Method TO-15 , EPA/625/R-96/010b, Second edition, January 1999</p>