



กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท
เขตราชเทวี กรุงเทพฯ ๑๐๕๐๐

၁၁ မတ် ၂၀၁၆

เรื่อง ต่ออายุหนังสือขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน
เรียน กรรมการผู้จัดการ บริษัท ดราวดิ่งแวลูเอ จำกัด
อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารเคมีของห้องปฏิบัติการวิเคราะห์เอกชน
ลงวันที่ ๘ ธันวาคม ๒๕๖๕

สิ่งที่ส่งมาด้วย เอกสารแบบท้ายหนังสือรับรองข้อเท็จจริงเป็นหนังสือปฏิบัติการวิเคราะห์เอกชน บริษัท ทรูจิวเวลรี่แวลูม จำกัด จำนวน ๑ แผ่น

ตามหนังสือที่ยังถึง บริษัท โทรจาลิ่งแวลด์อิม จำกัด ขอต่ออายุหนังสือรับขึ้นทะเบียน
ห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ๖-๓๐๑ สถานที่ที่เลขที่ ๔/๔ หมู่บ้าน บ้านกลางกรุ บิดาวัน
อาทิตย์ศรีรินทร์ ๔๖/๑ (ปราโมทย์) แขวงหนองบอน เขตประเวศ กรุงเทพมหานคร ออกรับใบอนุญาตสหกรณ์ นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้บริษัท ทรูจิวเวลรี่ แวลู จำกัด ต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน โดยมีองค์ประกอบดังนี้

ก. ผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์

ทะเบียนเลขที่ ว-๓๐๑-คิ-๐๐๐๑

ช. เจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์

ทะเบียนเลขที่ ว-๓๐๑-จิ-๐๐๐๑

ทะเบียนเลขที่ ๖๓๐๑-๖-๐๐๐๒

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9000-6-(9018-2) 10.9970000000

ค. ขอบข่ายสารมลพิษที่ได้รับขบขันเป็นให้คราะห์ในน้ำเสีย ตามสิ่งส่งมาด้วย

หนังสือฉบับนี้จะหมดอายุในวันที่ ๓ มกราคม ๒๕๖๙ หากประสงค์ต่ออายุหนังสือ
รับทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน ให้ยื่นคำขอต่อศูนย์รื้อถอนเอกสารประกอบคำขอต่อ
กรมโรงงานอุตสาหกรรม ภายใน ๓๐ วัน ก่อนวันสิ้นสุดของหนังสือรับทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน
ทั้งนี้ สามารถยื่นคำขอผ่านระบบอิเล็กทรอนิกส์ได้ทั้งนี้เว็บไซต์กรมโรงงานอุตสาหกรรม ตาม QR Code

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

ยื่นคำขอผ่านระบบอิเล็กทรอนิกส์

ผู้อำนวยการกอง รวและเลขานุการสหพันธ์แรงงาน
ปฏิบัติราชการแทนอธิบดีกรมโรงงานอุตสาหกรรม

กองวิจัยและเตือนภัยมลพิษโรงงาน

กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษและทะเบียนห้องปฏิบัติการ

โทร. ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๐๓-๕

โทรสาร ๐ ๒๔๓๐ ๒๓๑๒ ถึง ๒๕๕๕

โทรสาร : 0-26481970 โทรสาร : 0-26481971

ไปรษณีย์อิเล็กทรอนิกส์ sarabandiw@mail.go.th

Green Industry

"อุตสาหกรรมก้าวไกล ประเทศไทยก้าวหน้า ร่วมกันพัฒนา อุตสาหกรรมสีเขียว"



เอกสารแนบท้ายหนังสือรับต่ออายุขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์
บริษัท ทรูวาล์วส์สิ่งแวดล้อม จำกัด เลขทะเบียน ๖-๓๐๑
ที่ออก ๐๓๐๑(๑) // ๒๒๔ ๓ ลงวันที่ ๑ มกราคม ๒๕๖๖

ขอขยายสารมลพิษที่ได้รับขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๔ รายการ

น้ำเสีย จำนวน 4 รายการ

ลำดับที่	สารมลพิษ	วิธีการหาค่า
1	Biochemical Oxygen Demand	5-Day BOD Test, Membrane Electrode Method
2	pH	Electrometric Method
3	Total Dissolved Solids	Dried at 180 °C
4	Total Suspended Solids	Dried at 103-105 °C

เอกสารอ้างอิง

APHA, AWWA, WEF. Standard Methods for the Examination of Water and Wastewater.

23rd ed. Washington, DC: APHA, 2017.



CALIBRATION LABORATORY Co., LTD.

21/0-11,14,55 Soi Prasert Manukit 29 Yaek 4, Prasert Manukit Rd., Ladphrao, Bangkok 10230
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Tel. 02-578-0353-4 Fax. 02-578-2672 www.cal-laboratory.com E-mail:sale@cal-laboratory.com



REPORT OF CALIBRATION

FOR

NOMENCLATURE : DIGITAL THERMOMETER WITH PROBE
MANUFACTURER : LUTRON
MODEL / TYPE : MTM-380SD
SERIAL NO. : 1.570147/N/A[LA-0013/LA-0013/A]
DATE OF CALIBRATION : 09 April 2024

ENVIRONMENT CONDITIONS :

Temperature : $(23 \pm 2) ^\circ\text{C}$ Relative Humidity : $(55 \pm 10) \% \text{ RH}$

PROCEDURE USED :

This instrument was calibrated under procedure No. CLC-CPH-06 based on ASTM E 220-86 as calibration guidelines.

The calibration was performed by using Calibration Bath, Precision Thermometer and IPRT which maintained by the Calibration Laboratory Co., Ltd.

REFERENCE STANDARD USED :

1. Calibration Bath, Kambic Model OB-22/2 ULT, OB-22/2 S/N. 17115653, 17115654.
2. Precision Thermometer, ASL Model F200-A-8 S/N. 014433/03.
3. IPRT, ASL Model T100-250-1D, T100-450-1D S/N. L0193A-1-1, L1123A-1-5.

TRACEABILITY :

1. The measurements are traceable to International System of Units (SI), through Calibration Laboratory Co., Ltd. Certificate No. Q23136342, Q23126517. Due Date 20 December 2024, 20 November 2024.
2. The measurements are traceable to International System of Units (SI), through Thailand Institute of Scientific and Technological Research (TISTR). Certificate No. PSL-T 0203/67, Due Date 07 December 2024.
3. The measurements are traceable to International System of Units (SI), through National Institute of Metrology (Thailand). Certificate No. TT-0136-23, TT-0132-23. Due Date 12 December 2024, 22 November 2024.

UNCERTAINTY :

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2,00$ which for a normal distribution corresponds to a coverage probability of approximately 95 %. It has been evaluated according to the "Evaluation of the Uncertainty of Measurement in Calibration (EA-4/02 M:2022)"

Certificate No. Q24038373

F3-011-05/12-23

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@clcalibration



CALIBRATION LABORATORY Co., LTD.

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Tel. 02-578-0353-4 Fax. 02-578-2672 www.cal-laboratory.com E-mail:sale@cal-laboratory.com



CERTIFICATE OF CALIBRATION

FOR

NOMENCLATURE : DIGITAL THERMOMETER WITH PROBE
MANUFACTURER : LUTRON
MODEL / TYPE : MTM-380SD
SERIAL NO. : 1.570147/N/A[LA-0013/LA-0013/A]
CLID. NO. : 232204019
JOB CONTROL NO. : 240408038373
CALIBRATION SERVICE : ☒ IN-LABORATORY ☐ ON-SITE

CUSTOMER : ENVIRONMENTAL MEASUREMENTS CO., LTD.

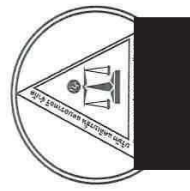
5/45 BAAN KLANG KRUNG BIZ TOWN, SOI SRINAGARINDRA 46/1 (PRAMOTE),
NONG BON SUB-DISTRICT, PRAWET DISTRICT, BANGKOK 10250

DATE OF RECEIVED : 08 April 2024

DATE OF ISSUED : 10 April 2024

The report of calibration shall not be reproduced except in full without approval of the Calibration Laboratory Co., Ltd.

Calibrated By :



Approved By :

Authorized Signatory
10 April 2024

This Calibration Certificate documents the traceability to national standards, which realize the units of measurement according to the International System of Units (SI)

Certificate No. Q24038373

F3-011-05/12-23

page 1 of 3



@clcalibration



CALIBRATION LABORATORY CO., LTD.

2/10-11, 14, 55 Soi Prasert Manukit 29 Yaek 4, Prasert Manukit Rd., Ladphrao, Bangkok 10230
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ANAB
ACCREDITED
CALIBRATION AND
DIMENSIONAL MEASUREMENT
ACDM-2814

CERTIFICATE OF CALIBRATION

FOR

NOMENCLATURE : DO METER
MANUFACTURER : YSI
MODEL / TYPE : 5000-230V/5010
SERIAL NO. : 16D101626/19D100367/DOM-01
CLID. NO. : 272100329
JOB CONTROL NO. : 240408038371
CALIBRATION SERVICE : ☒ IN-LABORATORY ☐ ON-SITE

CUSTOMER : ENVIRONMENTAL MEASUREMENTS CO., LTD.

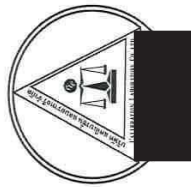
5/45 BAAN KLANG KRUNG BIZ TOWN, SOI SRINAGARINDRA 46/1 (PRAMOTE),
NONG BON SUB-DISTRICT, PRAWET DISTRICT, BANGKOK 10250

DATE OF RECEIVED : 08 April 2024

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Approved By :

Authorized Signatory

10 April 2024

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Certificate No. Q24038371

F3-011-05/12-23

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@clcalibration



CALIBRATION LABORATORY CO., LTD.

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ANAB
ACCREDITED
CALIBRATION AND
DIMENSIONAL MEASUREMENT
ACDM-2814

CONDITION OF CALIBRATION ITEM : RECEIVED IN GOOD OPERATIONAL CONDITION

MEASUREMENT RESULTS : (X) without adjustment () adjustment

The DUC Reading were recorded and the means value were reported of five times measurement in the table below.

CALIBRATION DATA

CORRECTION OF TEMPERATURE : T1 [THERMOCOUPLE TYPE K]

Immersion depth (mm)	Actual Temperature (°C)	DUC Reading (°C)	Correction (°C)	Uncertainty ± (°C)
200	4.00	4.2	-0.20	0.52
	20.01	20.3	-0.29	
	95.04	95.6	-0.56	
	104.02	104.9	-0.88	
	180.03	181.4	-1.37	

Note. The Scope of Accredited ANAB Certificate No. ACDM-2814 Version 012 Page 56 of 67

This report is valid for the above stated instrument/s only.

End of Certificate

Certificate No. Q24038373

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@clcalibration



CONDITION OF CALIBRATION ITEM : RECEIVED IN GOOD OPERATIONAL CONDITION
MEASUREMENT RESULTS : (X) without adjustment () adjustment

The table in the following gives the calibration results and associated measurement uncertainties of Do Meter.

CALIBRATION DATA

CORRECTION OF DO METER @ 20°C

Nominal Value (mg/L)	DUC Reading (mg/L)	Correction (mg/L)	Uncertainty (mg/L)
7.78	7.80	-0.02	± 0.38

Note. The Scope of Accredited ANAB Certificate No. ACDM-2814 Version 012 Page 5 of 67

This report is valid for the above stated instrument/s only.

End of Certificate

Certificate No. Q24038371

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@ccalibration



REPORT OF CALIBRATION

FOR

NOMENCLATURE : DO METER
MANUFACTURER : YSI
MODEL / TYPE : 5000-230V/5010
SERIAL NO. : 16D101626/19D100367[DOM-01]
DATE OF CALIBRATION : 09 April 2024

ENVIRONMENT CONDITIONS :

Temperature : $(25 \pm 2.5) ^\circ\text{C}$ Relative Humidity : $(50 \pm 15) \% \text{RH}$

PROCEDURE USED :

This instrument was calibrated under procedure No. CLC-CPCH-06. The calibration was performed by direct measurement with Certified Reference Material (CRM).

REFERENCE STANDARD USED :

Dissolved Oxygen, Sigma-Aldrich Product ID QC3077-500ML.

TRACEABILITY :

The measurements are traceable to International System of Units (SI), through Merck Co., Ltd.
Lot LRAD3840, Due Date October 2024.

UNCERTAINTY :

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2.00$ which for a normal distribution corresponds to a coverage probability of approximately 95 %.
It has been evaluated according to the "Evaluation of the Uncertainty of Measurement in Calibration (EA-4/02 M:2022)"

Certificate No. Q24038371

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@ccalibration

REPORT OF CALIBRATION

FOR

NOMENCLATURE : DIGITAL THERMOHYGRO METER
MANUFACTURER : DIGICON
MODEL / TYPE : TH-02A
SERIAL NO. : 1919E0284980[DTH-02]
DATE OF CALIBRATION : 10 April 2024

ENVIRONMENT CONDITIONS :

Temperature : $(23 \pm 2) ^\circ\text{C}$ Relative Humidity : $(55 \pm 10) \% \text{RH}$

PROCEDURE USED :

This instrument was calibrated under procedure No. CLC-CPTH-11. The calibration was performed by using Chilled Mirror Hygrometer which maintained by the Calibration Laboratory Co., Ltd.

REFERENCE STANDARD USED :

Chilled Mirror Hygrometer, Edgetech Model Dew Master S/N. 44602.
Temperature & Humidity Chamber, PGC Model 9141-5116 S/N. 1304261.

TRACEABILITY :

The measurements are traceable to International System of Units (SI), through Thunder Scientific Corporation.
Certificate No. 21594, Due Date 06 July 2024.

UNCERTAINTY :

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2.00$ which for a normal distribution corresponds to a coverage probability of approximately 95 %.
It has been evaluated according to the "Evaluation of the Uncertainty of Measurement in Calibration (EA-4/02 M:2022)"

Certificate No. Q24038370
F3-011-05/12-23



CERTIFICATE OF CALIBRATION

FOR

NOMENCLATURE : DIGITAL THERMOHYGRO METER
MANUFACTURER : DIGICON
MODEL / TYPE : TH-02A
SERIAL NO. : 1919E0284980[DTH-02]
CLID. NO. : 232100201
JOB CONTROL NO. : 240408038370
CALIBRATION SERVICE : ☒ IN-LABORATORY ☐ ON-SITE

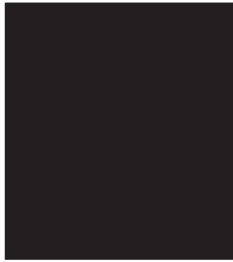
CUSTOMER : ENVIRONMENTAL MEASUREMENTS CO., LTD.
5/45 BAAN KLANG KRUNG BIZ TOWN, SOI SRINAGARINDRA 46/1 (PRAMOTE),
NONG BON SUB-DISTRICT, PRAWET DISTRICT, BANGKOK 10250

DATE OF RECEIVED : 08 April 2024

DATE OF ISSUED : 17 April 2024

The report of calibration shall not be reproduced except in full without approval of the Calibration Laboratory Co., Ltd.

Calibrated By :



Approved By :

Authorized Signatory

17 April 2024

This Calibration Certificate documents the traceability to national standards, which realize the units of measurement according to the International System of Units (SI)

Certificate No. Q24038370
F3-011-05/12-23





CALIBRATION LABORATORY Co., LTD.

2/10-11, 14, 55 Soi Prasert Manukit 29 Yaek 4, Prasert Manukit Rd., Ladphrao, Bangkok 10230
Tel. 02-578-0353-4 Fax. 02-578-2672 www.cal-laboratory.com E-mail: sale@cal-laboratory.com



CERTIFICATE OF CALIBRATION

FOR

NOMENCLATURE : DIGITAL THERMOHYGRO METER
MANUFACTURER : DIGICON
MODEL / TYPE : TH-02A
SERIAL NO. : 1919E0284991[DTH-01]
CLID. NO. : 232100200
JOB CONTROL NO. : 240408038369
CALIBRATION SERVICE : ☒ IN-LABORATORY ☐ ON-SITE

CUSTOMER : ENVIRONMENTAL MEASUREMENTS CO., LTD.

5/45 BAAK KLANG KRUNG BIZ TOWN, SOI SRINAGARINDRA 46/1 (PRAMOTE),
NONG BON SUB-DISTRICT, PRAWET DISTRICT, BANGKOK 10250

DATE OF RECEIVED : 08 April 2024

DATE OF ISSUED : 17 April 2024

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Approved By :

Authorized Signatory

17 April 2024

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Certificate No. Q24038369

F3-011-05/12-23

page 1 of 3



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Tel. 02-578-0353-4 Fax. 02-578-2672 www.cal-laboratory.com E-mail: sale@cal-laboratory.com



CONDITION OF CALIBRATION ITEM : RECEIVED IN GOOD OPERATIONAL CONDITION MEASUREMENT RESULTS : (X) without adjustment () adjustment

The table in the following gives the calibration results and associated measurement uncertainties of the measuring digital thermohygro meter.

CALIBRATION DATA

1. CORRECTION OF TEMPERATURE

Test point (° C)	Actual Temperature (° C)	DUC Reading (° C)	Correction (° C)	Uncertainty ± (° C)
20.0	20.00	19.7	+0.30	0.27
25.0	25.00	24.7	+0.30	
30.0	30.00	29.6	+0.40	

2. CORRECTION OF HUMIDITY

STD Temperature (° C)	STD Reading (%RH)	DUC Reading (%RH)	Correction (%RH)	Uncertainty ± (%RH)
25	40.0	33	+7.0	0.8
25	60.0	53	+7.0	0.9

Note. The Scope of Accredited ANAB Certificate No. ACDM-2814 Version 01/2 Page 59 of 67

This report is valid for the above stated instrument/s only.

End of Certificate

Certificate No. Q24038370

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@clcalibration

CONDITION OF CALIBRATION ITEM : RECEIVED IN GOOD OPERATIONAL CONDITION MEASUREMENT RESULTS : (X) without adjustment () adjustment

The table in the following gives the calibration results and associated measurement uncertainties of the measuring digital thermohygro meter.

CALIBRATION DATA

1. CORRECTION OF TEMPERATURE

Test point (° C)	Actual Temperature (° C)	DUC Reading (° C)	Correction (° C)	Uncertainty ± (° C)
20.0	20.00	19.6	+0.40	0.27
25.0	25.00	24.6	+0.40	
30.0	30.00	29.5	+0.50	

2. CORRECTION OF HUMIDITY

STD Temperature (° C)	STD Reading (%RH)	DUC Reading (%RH)	Correction (%RH)	Uncertainty ± (%RH)
25	40.0	32	+8.0	0.8
25	60.0	52	+8.0	0.9

Note. The Scope of Accredited ANAB Certificate No. ACDM-2814 Version 012 Page 59 of 67

This report is valid for the above stated instrument/s only.

End of Certificate

Certificate No. Q24038369

F3-011-05/12-23

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@ckcalibration

REPORT OF CALIBRATION

FOR

NOMENCLATURE : DIGITAL THERMOHYGRO METER
MANUFACTURER : DIGICON
MODEL / TYPE : TH-02A
SERIAL NO. : 1919E0284991 [DTH-01]
DATE OF CALIBRATION : 10 April 2024

ENVIRONMENT CONDITIONS :

Temperature : (23 ± 2) °C Relative Humidity : (55 ± 10) %RH

PROCEDURE USED :

This instrument was calibrated under procedure No. CLC-CPH-11. The calibration was performed by using Chilled Mirror Hygrometer which maintained by the Calibration Laboratory Co., Ltd.

REFERENCE STANDARD USED :

Chilled Mirror Hygrometer, Edgetech Model Dew Master S/N. 44602.
Temperature & Humidity Chamber, PGC Model 9141-5116 S/N. 1304261.

TRACEABILITY :

The measurements are traceable to International System of Units (SI), through Thunder Scientific Corporation.
Certificate No. 21594, Due Date 06 July 2024.

UNCERTAINTY :

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2.00$ which for a normal distribution corresponds to a coverage probability of approximately 95 %.
It has been evaluated according to the "Evaluation of the Uncertainty of Measurement in Calibration (EA-4/02 M:2022)"

Certificate No. Q24038369

F3-011-05/12-23

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@ckcalibration



REPORT OF CALIBRATION

FOR

NOMENCLATURE : WATER BATH
MANUFACTURER : M-LAB
MODEL / TYPE : WBN 15
SERIAL NO. : 0335[LA-007]
LOCATION SITE : LABORATORY-HOT ZONE
DATE OF CALIBRATION : 04 April 2024

ENVIRONMENT CONDITIONS :

Temperature : 24 °C to 25 °C
Relative Humidity : 50% to 52%

PROCEDURE USED :

This instrument was calibrated under procedure No. WI-305-135 based on ASTM E 715-80:2016 as calibration guidelines.
The calibration was performed by using Hydra Series II which maintained by the Calibration Laboratory Co., Ltd.

REFERENCE STANDARD USED :

Hydra Series II, Fluke Model 2635A S/N: 7107303.

TRACEABILITY :

The measurements are traceable to International System of Units (SI), through Calibration Laboratory Co., Ltd.
Certificate No. Q24026699, Due Date 13 September 2024.

UNCERTAINTY :

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2.00$ which for a normal distribution corresponds to a coverage probability of approximately 95 %.
It has been evaluated according to the "Evaluation of the Uncertainty of Measurement in Calibration (EA-4/02 M:2022)"

Certificate No. Q24024795

F3-011-05/12-23



CERTIFICATE OF CALIBRATION

FOR

NOMENCLATURE : WATER BATH
MANUFACTURER : M-LAB
MODEL / TYPE : WBN 15
SERIAL NO. : 0335[LA-007]
CLID. NO. : 332300657
JOB CONTROL NO. : 240307024795
CALIBRATION SERVICE : ☐ IN-LABORATORY ☒ ON-SITE

CUSTOMER : ENVIRONMENTAL MEASUREMENTS CO., LTD.

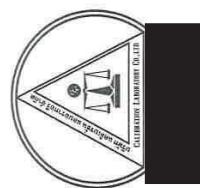
5/45 BAAN KLANG KRUNG BIZ TOWN, SOI SRINAGARINDRA 46/1 (PRAMOTE),
NONG BON SUB-DISTRICT, PRAWET DISTRICT, BANGKOK 10250

DATE OF RECEIVED : 07 March 2024

DATE OF ISSUED : 06 April 2024

The report of calibration shall not be reproduced except in full without approval of the Calibration Laboratory Co., Ltd.

Calibrated By :



Approved By :

Authorized Signatory

06 April 2024

This Calibration Certificate documents the traceability to national standards, which realize the units of measurement according to the International System of Units (SI)

Certificate No. Q24024795

F3-011-05/12-23





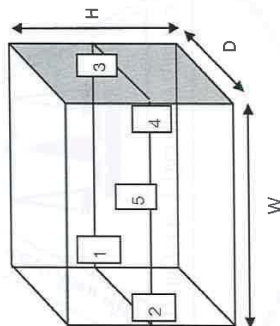
CALIBRATION DATA

2. TEMPERATURE DISTRIBUTION

Test Point (° C)	DUC Reading (° C)	STD Reading (° C)					Uncertainty ± (° C)
		Probe No. 1	Probe No. 2	Probe No. 3	Probe No. 4	Probe No. 5	
85.0	85.0	84.37	84.87	84.67	84.86	84.71	0.60

Technical Note : W = 35 cm, D = 30 cm, H = 15 cm.

The Scope of Accredited TISI Certificate No. 23-LB0092 Issue 02 Page 128 of 138



This report is valid for the above stated instrument/s only.

End of Certificate





CALIBRATION LABORATORY Co., LTD.

2/10-11, 14, 55 Soi Prasert Manukit 29 Yaek 4, Prasert Manukit Rd., Ladphrao, Bangkok 10230
Tel. 02-578-0353-4 Fax: 02-578-2672 www.cal-laboratory.com E-mail: sale@cal-laboratory.com



REPORT OF CALIBRATION

FOR

NOMENCLATURE : WATER BATH
MANUFACTURER : MEMMERT
MODEL / TYPE : WNB14
SERIAL NO. : L418.0758[LA-004]
LOCATION SITE : LABORATORY-HOT ZONE
DATE OF CALIBRATION : 04 April 2024

ENVIRONMENT CONDITIONS :

Temperature : 24 °C to 25 °C

Relative Humidity : 50% to 52%

PROCEDURE USED :

This instrument was calibrated under procedure No. WI-305-135 based on ASTM E 715-80:2016 as calibration guidelines.
The calibration was performed by using Hydra Series II which maintained by the Calibration Laboratory Co., Ltd.

REFERENCE STANDARD USED :

Hydra Series II, Fluke Model 2635A S/N. 7107303.

TRACEABILITY :

The measurements are traceable to International System of Units (SI), through Calibration Laboratory Co., Ltd.
Certificate No. Q24026699, Due Date 13 September 2024.

UNCERTAINTY :

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2.00$ which for a normal distribution corresponds to a coverage probability of approximately 95 %.
It has been evaluated according to the "Evaluation of the Uncertainty of Measurement in Calibration (EA-4/02 M:2022)"

Certificate No. Q24024794

F3-011-05/12-23

page 2 of 4



@ckcalibration



CALIBRATION LABORATORY Co., LTD.

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Tel. 02-578-0353-4 Fax: 02-578-2672 www.cal-laboratory.com E-mail: sale@cal-laboratory.com



CERTIFICATE OF CALIBRATION

FOR

NOMENCLATURE : WATER BATH
MANUFACTURER : MEMMERT
MODEL / TYPE : WNB14
SERIAL NO. : L418.0758[LA-004]
CLID. NO. : 332100157
JOB CONTROL NO. : 240307024794
CALIBRATION SERVICE : ☐ IN-LABORATORY ☒ ON-SITE

CUSTOMER : ENVIRONMENTAL MEASUREMENTS CO., LTD.

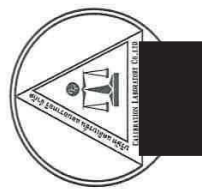
5/45 BAAN KLANG KRUNG BIZ TOWN, SOI SRINAGARINDRA 46/1 (PRAMOTE),
NONG BON SUB-DISTRICT, PRAWET DISTRICT, BANGKOK 10250

DATE OF RECEIVED : 07 March 2024

DATE OF ISSUED : 06 April 2024

The report of calibration shall not be reproduced except in full without approval of the Calibration Laboratory Co., Ltd.

Calibrated By :



Approved By :

Authorized Signatory

06 April 2024

This Calibration Certificate documents the traceability to national standards, which realize the units of measurement according to the International System of Units (SI)

Certificate No. Q24024794

F3-011-05/12-23

page 1 of 4



@ckcalibration



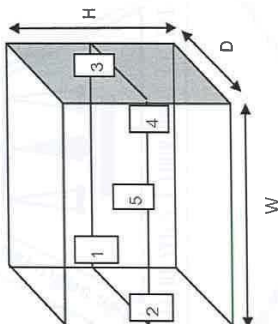
CALIBRATION DATA

2. TEMPERATURE DISTRIBUTION

Test Point (° C)	DUC Reading (° C)	STD Reading (° C)					Uncertainty ± (° C)
		Probe No. 1	Probe No. 2	Probe No. 3	Probe No. 4	Probe No. 5	
95.0	95.0	96.62	96.74	96.93	96.68	96.66	0.65

Technical Note : W = 35 cm, D = 29 cm, H = 14 cm.

The Scope of Accredited TISI Certificate No. 23-LB0092 Issue 02 Page 128 of 138



This report is valid for the above stated instrument/s only.

End of Certificate



CONDITION OF CALIBRATION ITEM : RECEIVED IN GOOD OPERATIONAL CONDITION

MEASUREMENT RESULTS : (X) without adjustment () adjustment

The table in the following gives the calibration results and associated measurement uncertainties of the measuring water bath.

CALIBRATION DATA

1. WATER BATH PERFORMANCE

Test Point (° C)	DUC Reading (° C)	Uniformity (° C)	Stability (° C)
95.0	95.0	0.50	0.21





REPORT OF CALIBRATION

FOR

NOMENCLATURE : REFRIGERATOR
MANUFACTURER : MEDICOOL
MODEL / TYPE : BB-117
SERIAL NO. : BB117-190725001[LA-003]
LOCATION SITE : LABORATORY
DATE OF CALIBRATION : 04 April 2024

ENVIRONMENT CONDITIONS :

Temperature : 24 °C to 25 °C

Relative Humidity : 50 % to 52 %

PROCEDURE USED :

This instrument was calibrated under procedure No. WI-305-165 based on TLAS G-20-1/02-08 as calibration guidelines.
The calibration was performed by using Hydra Data Logger which maintained by the Calibration Laboratory Co., Ltd.

REFERENCE STANDARD USED :

Hydra Data Logger, Fluke Model 2620 S/N. 5592550.

TRACEABILITY :

The measurements are traceable to International System of Units (SI), through Calibration Laboratory Co., Ltd.
Certificate No. Q23065868, Due Date 22 June 2024.

UNCERTAINTY :

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor complies with the table which for a normal distribution corresponds to a coverage probability of approximately 95 %.
It has been evaluated according to the "Evaluation of the Uncertainty of Measurement in Calibration (EA-4/02 M:2022)"

Certificate No. Q24024793

F3-011-05/12-23



CERTIFICATE OF CALIBRATION

FOR

NOMENCLATURE : REFRIGERATOR
MANUFACTURER : MEDICOOL
MODEL / TYPE : BB-117
SERIAL NO. : BB117-190725001[LA-003]
CLID. NO. : 332100156
JOB CONTROL NO. : 240307024793
CALIBRATION SERVICE : ☐ IN-LABORATORY ☒ ON-SITE

CUSTOMER :

ENVIRONMENTAL MEASUREMENTS CO., LTD.
5/45 BAAN KLANG KRUNG BIZ TOWN, SOI SRINAGARINDRA 46/1 (PRAMOTE),
NONG BON SUB-DISTRICT, PRAWET DISTRICT, BANGKOK 10250

DATE OF RECEIVED : 07 March 2024

DATE OF ISSUED : 06 April 2024

The report of calibration shall not be reproduced except in full without approval of the Calibration Laboratory Co., Ltd.

Calibrated By :



Approved By :

Authorized Signatory

06 April 2024

This Calibration Certificate documents the traceability to national standards, which realize the units of measurement according to the International System of Units (SI)

Certificate No. Q24024793

F3-011-05/12-23





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Tel. 02-578-0353-4 Fax: 02-578-2672 www.cal-laboratory.com E-mail: sale@cal-laboratory.com



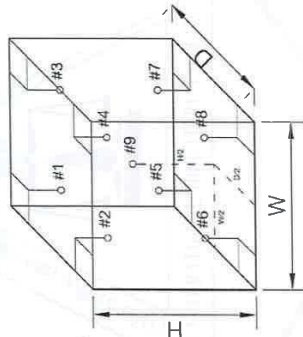
2. TEMPERATURE DISTRIBUTION

CALIBRATION DATA

DUC		Measured Temperature (°C) @Probe No.9 is Ref.									Uncertainty ± (°C)	Coverage factor k
Setting (°C)	Indicating (°C)	1	2	3	4	5	6	7	8	9		
4.0	4.0	3.22	3.93	3.21	3.93	3.52	3.29	3.02	3.18	3.31	1.40	2.00

Technical Note : W = 50 cm, D = 50 cm, H = 120 cm.

The Scope of Accredited TISI Certificate No. 23-LB0092 Issue 02 Page 129 of 138



This report is valid for the above stated instrument/s only.

End of Certificate

Certificate No. Q24024793
F3-011-05/12-23

Certificate No. Q24024793
F3-011-05/12-23





CALIBRATION LABORATORY Co., LTD.

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Tel. 02-578-0353-4 Fax: 02-578-2672 www.cal-laboratory.com E-mail:sale@cal-laboratory.com



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ISO/IEC 17025

REPORT OF CALIBRATION

FOR

NOMENCLATURE : INCUBATOR
MANUFACTURER : ACCUPLUS
MODEL / TYPE : SMART i250
SERIAL NO. : 2059-0718-0010[LA-002]
LOCATION SITE : LABORATORY
DATE OF CALIBRATION : 04 April 2024

ENVIRONMENT CONDITIONS :

Temperature : 24 °C to 25 °C
Relative Humidity : 50 % to 52 %

PROCEDURE USED :

This instrument was calibrated under procedure No. WI-305-165 based on TLAS G-20-1/02-08 as calibration guidelines.
The calibration was performed by using Hydra Data Logger which maintained by the Calibration Laboratory Co., Ltd.

REFERENCE STANDARD USED :

Hydra Data Logger, Fluke Model 2620 S/N. 5592550.

TRACEABILITY :

The measurements are traceable to International System of Units (SI) , through Calibration Laboratory Co., Ltd.
Certificate No. Q23065868, Due Date 22 June 2024.

UNCERTAINTY :

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor complies with the table which for a normal distribution corresponds to a coverage probability of approximately 95 %.
It has been evaluated according to the "Evaluation of the Uncertainty of Measurement in Calibration (EA-4/02 M:2022)"

Certificate No. Q24024792
F3-011-05/12-23



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CERTIFICATE OF CALIBRATION

FOR

NOMENCLATURE : INCUBATOR
MANUFACTURER : ACCUPLUS
MODEL / TYPE : SMART i250
SERIAL NO. : 2059-0718-0010[LA-002]
CLID. NO. : 332100155
JOB CONTROL NO. : 240307024792
CALIBRATION SERVICE : ☐ IN-LABORATORY ☒ ON-SITE
CUSTOMER : ENVIRONMENTAL MEASUREMENTS CO., LTD.
5/45 BAAN KLANG KRUNG BIZ TOWN, SOI SRINAGARINDRA 46/1 (PRAMOTE),
NONG BON SUB-DISTRICT, PRAWET DISTRICT, BANGKOK 10250

DATE OF RECEIVED : 07 March 2024

DATE OF ISSUED : 06 April 2024

The report of calibration shall not be reproduced except in full without approval of the Calibration Laboratory Co., Ltd.

Calibrated By :



Approved By :

Authorized Signatory
06 April 2024

This Calibration Certificate documents the traceability to national standards, which realize the units of measurement according to the International System of Units (SI)

Certificate No. Q24024792
F3-011-05/12-23



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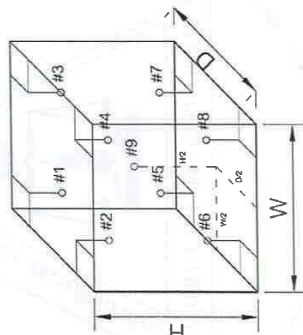
CALIBRATION DATA

2. TEMPERATURE DISTRIBUTION

DUC			Measured Temperature (°C) @Probe No.9 is Ref.									Uncertainty ± (°C)	Coverage factor <i>k</i>
Setting (°C)	Indicating (°C)		1	2	3	4	5	6	7	8	9		
20.0	20.0		20.58	20.70	20.70	20.46	20.54	20.53	20.53	20.36	20.39	0.68	2.00

Technical Note : W = 50 cm, D = 48 cm, H = 110 cm.

The Scope of Accredited TISI Certificate No. 23-LB0092 Issue 02 Page 129 of 138



This report is valid for the above stated instrument/s only.

End of Certificate



CONDITION OF CALIBRATION ITEM : RECEIVED IN GOOD OPERATIONAL CONDITION

MEASUREMENT RESULTS : (X) without adjustment () adjustment

The table in the following gives the calibration results and associated measurement uncertainties of the measuring incubator.

CALIBRATION DATA

1. INCUBATOR PERFORMANCE

Setting (°C)	DUC		Measured Uniformity (°C)	Measured Stability (°C)	Measured Overall Variation (°C)
	Indicating (°C)				
20.0	20.0		0.52	0.46	1.06





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ANAB National Accreditation Board
ACCREDITED
CALIBRATION AND
DIMENSIONAL MEASUREMENT
ACDM-2014



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ANAB National Accreditation Board
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ACDM-2014

REPORT OF CALIBRATION

FOR

NOMENCLATURE : HOT AIR OVEN
MANUFACTURER : MEMMERT
MODEL / TYPE : UF110
SERIAL NO. : B422.0026[L A-0012]
LOCATION SITE : LABORATORY-HOT ZONE
DATE OF CALIBRATION : 04 April 2024

ENVIRONMENT CONDITIONS :

Temperature : 24 °C to 25 °C

Relative Humidity : 50% to 52 %

PROCEDURE USED :

This instrument was calibrated under procedure No. CLC-CPTH-07 based on TLAS G-20 as calibration guidelines.
The calibration was performed by using Hydra Data Logger which maintained by the Calibration Laboratory Co., Ltd.

REFERENCE STANDARD USED :

Hydra Data Logger, Fluke Model 2620 S/N: 5592550.

TRACEABILITY :

The measurements are traceable to International System of Units (SI) , through Calibration Laboratory Co., Ltd.
Certificate No. Q23065868, Due Date 22 June 2024.

UNCERTAINTY :

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor complies with the table which for a normal distribution corresponds to a coverage probability of approximately 95 %.
It has been evaluated according to the "Evaluation of the Uncertainty of Measurement in Calibration (EA-4/02 M:2022)"

Certificate No. Q24024791

F3-011-05/12-23

page 2 of 4



@clcalibration

u.14/16

FOR

NOMENCLATURE : HOT AIR OVEN
MANUFACTURER : MEMMERT
MODEL / TYPE : UF110
SERIAL NO. : B422.0026[L A-0012]
CLID. NO. : 332202464
JOB CONTROL NO. : 240307024791
CALIBRATION SERVICE : ☐ IN-LABORATORY ☒ ON-SITE

CUSTOMER : ENVIRONMENTAL MEASUREMENTS CO., LTD.

5/45 BAAN KLANG KRUNG BIZ TOWN, SOI SRINAGARINDRA 46/1 (PRAMOTE),
NONG BON SUB-DISTRICT, PRAWET DISTRICT, BANGKOK 10250

DATE OF RECEIVED : 07 March 2024

DATE OF ISSUED : 06 April 2024

The report of calibration shall not be reproduced except in full without approval of the Calibration Laboratory Co., Ltd.

Calibrated By :



Approved By :

Authorized Signatory

06 April 2024

This Calibration Certificate documents the traceability to national standards, which realize the units of measurement according to the International System of Units (SI)

Certificate No. Q24024791

F3-011-05/12-23

page 1 of 4



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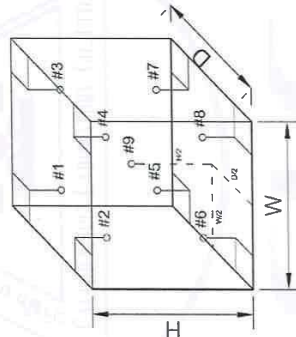
CALIBRATION DATA

2. TEMPERATURE DISTRIBUTION

DUC		Measured Temperature (°C)@Probe No.9 is Ref.									Uncertainty ± (°C)	Coverage factor <i>k</i>
Setting (°C)	Indicating (°C)	1	2	3	4	5	6	7	8	9		
104.0	104.0	103.11	104.12	103.56	103.79	103.72	103.88	103.57	104.18	103.88	0.45	2.00
180.0	180.0	178.33	180.32	178.77	179.54	179.26	179.74	179.19	180.15	179.58	0.55	2.00

Technical Note : W = 56 cm, D = 40 cm, H = 48 cm.

Note. The Scope of Accredited ANAB Certificate No. ACDM-2814 Version 012 Page 58 of 67



This report is valid for the above stated instrument/s only.

End of Certificate



CONDITION OF CALIBRATION ITEM : RECEIVED IN GOOD OPERATIONAL CONDITION

MEASUREMENT RESULTS : (X) without adjustment () adjustment

The table in the following gives the calibration results and associated measurement uncertainties of the measuring hot air oven.

CALIBRATION DATA

1. HOT AIR OVEN PERFORMANCE

Setting (°C)	DUC		Measured Uniformity (°C)	Measured Stability (°C)	Measured Overall Variation (°C)
	Indicating (°C)	Indicating (°C)			
104.0	104.0	104.0	0.81	0.07	1.20
180.0	180.0	180.0	1.35	0.19	2.17



REPORT OF CALIBRATION

FOR

NOMENCLATURE : BALANCE
MANUFACTURER : METTLER TOLEDO
MODEL / TYPE : MS204TS/00
SERIAL NO. : B935191252[LA-002]
LOCATION SITE : LABORATORY - BALANCE ROOM
DATE OF CALIBRATION : 04 April 2024

ENVIRONMENT CONDITIONS :

Temperature : 24 °C to 25 °C Relative Humidity : 50 % to 51 %

PROCEDURE USED :

This instrument was calibrated under procedure No. WI-305-46 based on EURAMET cg-18 Version 4.0 (11/2015).
The calibration was performed by Comparison with Weight Set which maintained by the Calibration Laboratory Co., Ltd.

REFERENCE STANDARD USED :

1. Weight Set, Phoenix Class E2 S/N. WBS-SET-E2-01.
2. Weight, Sartorius Class E2 S/N. 44329129, 43529037, 44329167, 43529293.

TRACEABILITY :

1. The measurements are traceable to International System of Units (SI), through National Institute of Metrology (Thailand).
Certificate No. MM-0123-22, Due Date 22 August 2024.
2. The measurements are traceable to International System of Units (SI), through Sartorius Lab Instruments GmbH & Co. KG.
Certificate No. M141607, M141608, M141609, M141611. Due Date 15 September 2025.

UNCERTAINTY :

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor complies with the table which for a normal distribution corresponds to a coverage probability of approximately 95%. It has been evaluated according to the "Evaluation of the Uncertainty of Measurement in Calibration (EA-4/02 M:2022)"

Certificate No. Q24024790

F3-011-05/12-23

page 2 of 3



@clcalibration

FOR

NOMENCLATURE : BALANCE
MANUFACTURER : METTLER TOLEDO
MODEL / TYPE : MS204TS/00
SERIAL NO. : B935191252[LA-002]
CLID. NO. : 362200356
JOB CONTROL NO. : 240307024790
CALIBRATION SERVICE : ☐ IN-LABORATORY ☒ ON-SITE

CUSTOMER : ENVIRONMENTAL MEASUREMENTS CO., LTD.

5/45 BAAN KLANG KRUNG BIZ TOWN, SOI SRINAGARINDRA 46/1 (PRAMOTE),
NONG BON SUB-DISTRICT, PRAWET DISTRICT, BANGKOK 10250

DATE OF RECEIVED : 07 March 2024

DATE OF ISSUED : 08 April 2024

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Calibrated By :



Approved By :

Authorized Signatory

08 April 2024

This Calibration Certificate documents the traceability to national standards, which realize the units of measurement according to the International System of Units (SI)

Certificate No. Q24024790

F3-011-05/12-23

page 1 of 3



@clcalibration

CERTIFICATE OF CALIBRATION

FOR

NOMENCLATURE : BALANCE
MANUFACTURER : SHIMADZU
MODEL / TYPE : AP225WD
SERIAL NO. : D316300692[LA-001]
CLID. NO. : 362100172
JOB CONTROL NO. : 240307024789
CALIBRATION SERVICE : ☐ IN-LABORATORY ☒ ON-SITE

CUSTOMER : ENVIRONMENTAL MEASUREMENTS CO., LTD.

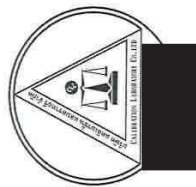
5/45 BAAN KLANG KRUNG BIZ TOWN, SOI SRINAGARINDRA 46/1 (PRAMOTE),
NONG BON SUB-DISTRICT, PRAWET DISTRICT, BANGKOK 10250

DATE OF RECEIVED : 07 March 2024

DATE OF ISSUED : 05 April 2024

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Calibrated By :



Approved By :

Authorized Signatory

05 April 2024

This Calibration Certificate documents the traceability to national standards, which realize the units of measurement according to the International System of Units (SI)

Certificate No. Q24024789

F3-011-05/12-23

page 1 of 3



@clcalibration

CONDITION OF CALIBRATION ITEM : RECEIVED IN GOOD OPERATIONAL CONDITION

MEASUREMENT RESULTS : (X) without adjustment () adjustment

CALIBRATION DATA

1. Error of indications

Nominal Test Value (g)	Conventional mass (g)	Display Value (g)	Error of Balance (g)	Uncertainty \pm (mg)	Coverage factor k
Unload	0.0000	0.0000	0.0000	0.07	2.00
0.1000	0.1000	0.0999	-0.0001	0.11	2.00
0.5000	0.5000	0.5000	0.0000	0.11	2.00
1.0000	1.0000	1.0000	0.0000	0.11	2.00
2.0000	2.0000	2.0000	0.0000	0.11	2.00
5.0000	5.0000	4.9999	-0.0001	0.11	2.00
10.0000	10.0000	9.9999	-0.0001	0.11	2.00

2. Repeatability of indications

Nominal Test Value (g)	Standard Deviation of Reading (g)
200.0000	0.00005

3. Effect of eccentric application of a load on the indication

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Note. The Scope of Accredited TISI Certificate No. 23-LB0092 Issue 02 Page 116 of 138

This report is valid for the above stated instrument/s only.

End of Certificate

Certificate No. Q24024790

F3-011-05/12-23

page 3 of 3



@clcalibration



REPORT OF CALIBRATION

FOR

NOMENCLATURE : PRIMARY FLOW CALIBRATOR
MANUFACTURER : MESALABS
MODEL / TYPE : DEFENDER 510-M
SERIAL NO. : 172525
DATE OF CALIBRATION : 11 October 2024

ENVIRONMENT CONDITIONS :

Temperature : $(23 \pm 2) ^\circ\text{C}$ Relative Humidity : $(55 \pm 10) \% \text{ RH}$

PROCEDURE USED :

This instrument was calibrated under procedure No. CLC-CPPF-03. The calibration was performed by comparison with Gas Flow Meter which refers to the standard condition of 101.325 kPa and 0 $^\circ\text{C}$.

REFERENCE STANDARD USED :

Gas Flow Meter, Alicat Scientific Model M-5SLPM-D-DB15 S/N. 261330.

TRACEABILITY :

The measurements are traceable to International System of Units (SI), through Chell Instrument Ltd.
Certificate No. N037064, Due Date 26 February 2025.

UNCERTAINTY :

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor complies with the table which for a normal distribution corresponds to a coverage probability of approximately 95 %.
It has been evaluated according to the "Evaluation of the Uncertainty of Measurement in Calibration (EA-4/02 M:2022)"

Certificate No. Q24108770
F3-011-05/12-23



CERTIFICATE OF CALIBRATION

FOR

NOMENCLATURE : PRIMARY FLOW CALIBRATOR
MANUFACTURER : MESALABS
MODEL / TYPE : DEFENDER 510-M
SERIAL NO. : 172525
CLID. NO. : 212401789
JOB CONTROL NO. : 241010108770
CALIBRATION SERVICE : ☒ IN-LABORATORY ☐ ON-SITE

CUSTOMER : ENVIRONMENTAL MEASUREMENTS CO., LTD.

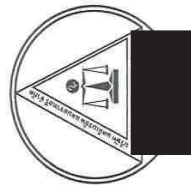
5/45 BAAN KLANG KRUNG BIZ TOWN, SOI SRINAGARINDRA 46/1 (PRAMOTE),
NONG BON SUB-DISTRICT, PRAWET DISTRICT, BANGKOK 10250

DATE OF RECEIVED : 10 October 2024

DATE OF ISSUED : 15 October 2024

The report of calibration shall not be reproduced except in full without approval of the Calibration Laboratory Co., Ltd.

Calibrated By :



Approved By :

Authorized Signatory
15 October 2024

This Calibration Certificate documents the traceability to national standards, which realize the units of measurement according to the International System of Units (SI)

Certificate No. Q24108770
F3-011-05/12-23



CERTIFICATE OF CALIBRATION

Certificate No. : COF-042-67

MEASUREMENT ITEM
MANUFACTURER
MODEL/TYPE
SERIAL NUMBER
ID NUMBER
CONDITION AS-RECEIVED
CUSTOMER

: Top Load Office
: Thermo Scientific
: G25A
: 3375
: Used Item
: Environmental Measurements Co., Ltd.
5/45 Baan Klang Krung Biz Town, Soi Srinagarindra 46/1
(Pramote), Nong Bon Sub-District Prawet District, Bangkok
10250

RECEIVED DATE
MEASUREMENT DATE
ISSUE DATE

: 27 Sep 2024
: 08 Oct 2024
: 08 Oct 2024

ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follow:

Temperature : 23.0 ± 3.0 °C
Relative Humidity : 55.0 ± 15.0 %RH
Atmospheric Pressure : 1010 ± 10 hPa

CALIBRATION CONDITION:

Preconditioning : 24 hours at ambient conditions.
Measurement Condition : The average values during measurement are 23.7 °C and 52.7 %RH.

NOTED: The certificate is valid only to the item calibrated on date and place of calibration.

TABULATION OF RESULTS:

The table on next page give the measured values.

Calibrated by:

☐ Mr. Sorawit Thachalad
☒ Miss Jitraporn Lertsomphol

Approved signatory:



CONDITION OF CALIBRATION ITEM : RECEIVED IN GOOD OPERATIONAL CONDITION

MEASUREMENT RESULTS : (X) without adjustment () adjustment

The table in the following gives the calibration results and associated measurement uncertainties of the measuring primary flow calibrator.

CALIBRATION DATA

DUC Setting (L / min)	STD Reading (L / min)	Correction (L / min)	Uncertainty \pm (L / min)
0.500	0.51828	+0.01828	0.57735
1.000	1.0326	+0.0326	0.5774
2.000	2.0561	+0.0561	0.5774
5.000	5.1183	+0.1183	0.5781

Technical Note, Media of Gas : Air

Setting Temperature 23 ± 3 °C ; Pressure 101.3 kPa

Note. The Scope of Accredited ANAB Certificate No. ACDM-2814 Version 012 Page 48 of 67

This report is valid for the above stated instrument/s only.

End of Certificate

Certificate No. Q24108770

F3-011-05/12-23

page 3 of 3



@cccalibration

THAI METEOROLOGICAL DEPARTMENT

4353 Sukhumvit, Bangna, Bangkok 10260 Tel. 081-454-2804, 0-2399-0469

Calibration Certificate



Issued by : Calibration & Test Section : Meteorological Instruments Bureau

Date of Issue : 3 October, 2023 Certification No. 344/23

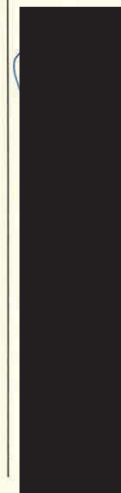
Page : 1 of 2

Object : Wind speed and wind direction
 Manufacturer : Sensor : NRG
 Basic Datalogger : Symphonie
 Type : Sensor : 40C Basic Datalogger : LR20
 Serial No. : Sensor : 1795-00135858 Basic Datalogger : 309013229

Customer : Environmental Measurements Co., Ltd.
 5/45 Baan Klang Krung Biz Town, Soi Srinagarindra 48/1 (Pramote),
 Nong Bon Sub-District, Prawet District, Bangkok 10250.

Calibration Condition : Temperature 25.1 °C Barometric Pressure 1011.3 hPa

NATIONAL STANDARD WIND TUNNEL :
 : Thermal Anemometer 642 S/N 91563
 : HOOK GAGE NO 1425 Pilot Tube Theodor Friedrichs Type 0800.0000 serial 9023
 N.I.S.T. Test Reference Number 731/241460 : Standard Velocity at 20 - 30 m/sec
 : Ultrasonic Anemometer Model DA-650-3TV (sensor TR-90AH)
 Serial Number 110730029 (sensor 120629586)
 JAPAN QUALITY ASSURANCE ORGANIZATION : Standard Velocity at 0 - 20 m/sec



Mechanical Engineer



Continuation of Certificate of Calibration Number COF-042-67

Page 2 of 2 Pages

MEASUREMENT RESULTS:

The Orifice gas flow device was calibrated by direct comparison method with the Standard Rotary Displacement Meter (Roots Meter). The Humid air was used as a medium in the system. The standard conditions are 25 °C (298.15 K) and 760 mmHg for standard temperature and standard pressure respectively.

Table 1: The results of Q Standard calibration data

Plate	Flow rate m ³ /min	Pressure [Pa] mmHg	Temperature [T _a] °C	Temperature [T _m] °C	Δp _meter mmHg	Δp _Orifice InH ₂ O	Y	Standard flow [Q _s] m ³ /min
1	0.702	757.395	23.63	22.54	57.122	1.729	1.316	0.653
2	1.000	757.471	23.83	22.84	61.580	3.472	1.864	0.923
3	1.119	757.263	23.92	22.82	43.090	4.596	2.144	1.059
4	1.165	757.228	23.85	22.65	30.341	5.160	2.272	1.123
5	1.409	757.252	23.68	22.47	30.293	7.615	2.761	1.359

Slope (m): 2.04447
 Intercept (b): -0.02098
 Correlation coefficient (r): 0.99989
 Uncertainty (k=2): 0.015 m³/min

Table 2: The results of Q actual calibration data

Plate	Flow rate m ³ /min	Pressure [Pa] mmHg	Temperature [T _a] °C	Temperature [T _m] °C	Δp _meter mmHg	Δp _Orifice InH ₂ O	Y	Standard flow [Q _s] m ³ /min
1	0.702	757.395	23.63	22.54	57.122	1.729	0.823	0.652
2	1.000	757.471	23.83	22.84	61.580	3.472	1.167	0.922
3	1.119	757.263	23.92	22.82	43.090	4.596	1.343	1.059
4	1.165	757.228	23.85	22.65	30.341	5.160	1.423	1.123
5	1.409	757.252	23.68	22.47	30.293	7.615	1.728	1.358

Slope (m): 1.28051
 Intercept (b): -0.01311
 Correlation coefficient (r): 0.99989
 Uncertainty (k=2): 0.015 m³/min

End of Certificate of Calibration





CALIBRATION LABORATORY CO., LTD.

2/10-11,14,55 Soi Prasert Manukit 29 Yaek 4, Prasert Manukit Rd., Ladphrao, Bangkok 10230
Tel. 02-578-0553-4 Fax. 02-578-2672 www.cali-laboratory.com E-mail:sale@cali-laboratory.com



NSC-TIS-TIS 17025
CALIBRATION 0059
CLC

CERTIFICATE OF CALIBRATION

FOR

NOMENCLATURE : VIBRATION METER
MANUFACTURER : VIBROCK
MODEL / TYPE : V9000
SERIAL NO. : 2351
CLID. NO. : 252101273
JOB CONTROL NO. : 240912097767
CALIBRATION SERVICE : ☒ IN-LABORATORY ☐ ON-SITE

CUSTOMER : ENVIRONMENTAL MEASUREMENTS CO., LTD.
5/45 BAAN KLANG KRUNG BIZ TOWN, SOI SRINAGARINDRA 46/1 (PRAMOTE),
NONG BON SUB-DISTRICT, PRAWET DISTRICT, BANGKOK 10250

DATE OF RECEIVED : 12 September 2024 DATE OF ISSUED : 16 September 2024
The report of calibration shall not be reproduced except in full without approval of the Calibration Laboratory Co., Ltd.

Calibrated By :



Approved By :

Authorized Signatory

16 September 2024

This Calibration Certificate documents the traceability to national standards, which realize the units of measurement according to the International System of Units (SI)

Certificate No. Q24097767

F3-011-05/12-23

page 1 of 3



@clcalibration



THAI METEOROLOGICAL DEPARTMENT

4353 Sukhumvit, Bangna, Bangkok 10260 Tel. 081-454-2804, 0-2399-0469

The Result of Calibration

Certification No. 344/23

Page : 2 of 2

3 October, 2023

Standard Ultrasonic Anemometer m/sec	HOOK GAGE NO. 1425			TESTED ANEMOMETER	
	Pressure inches H ₂ O	Vacuum inches H ₂ O	Velocity m/sec	Velocity m/sec	Correction m/sec
1.00	-	-	-	0.95	0.05
3.02	-	-	-	2.85	0.17
5.00	-	-	-	4.95	0.05
7.00	-	-	-	6.85	0.15
9.02	-	-	-	8.95	0.07
11.01	-	-	-	10.85	0.16
13.01	-	-	-	12.99	0.02
15.01	-	-	-	15.10	-0.09
17.02	-	-	-	16.98	0.04
20.02	-	-	-	20.13	-0.11

Wind Aloft Plotting Board.	
US DEPARTMENT OF COMMERCE WEATHER BUREAU	
WIND DIRECTION	TESTED WIND DIRECTION
0	0
90	90
180	180
270	270

Calibrated by :
[Redacted Signature]

Mechanical Engineer





CONDITION OF CALIBRATION ITEM : RECEIVED IN GOOD OPERATIONAL CONDITION
MEASUREMENT RESULTS : (X) without adjustment () adjustment

CALIBRATION DATA

VELOCITY RESULT

Test point		Mode	STD Reading (mm/s)	DUC Reading (mm/s)	Correction (mm/s)	Uncertainty \pm (% of rdg.)
(mm/s)	(frequency)					
10	160 Hz	peak	10.00	9.82	+0.18	1.1
20	160 Hz		20.00	19.44	+0.56	1.0
40	160 Hz		40.00	39.23	+0.77	1.0
60	160 Hz		60.00	58.94	+1.06	1.0
80	160 Hz		80.00	78.55	+1.45	1.0
100	160 Hz		100.00	97.49	+2.51	1.0

Note. The Scope of Accredited TISI Certificate No. 23-LB0092 Issue 02 Page 60 of 138

This report is valid for the above stated instrument/s only.

End of Certificate



REPORT OF CALIBRATION

FOR

NOMENCLATURE : VIBRATION METER
MANUFACTURER : VIBROCK
MODEL / TYPE : V9000
SERIAL NO. : 2351
DATE OF CALIBRATION : 13 September 2024

ENVIRONMENT CONDITIONS :

Temperature : $(23 \pm 2) ^\circ\text{C}$

Relative Humidity : $(55 \pm 15) \% \text{RH}$

PROCEDURE USED :

This instrument was calibrated under procedure No. WI-305-127 based on ISO 16063-21 as calibration guideline.

The calibration was performed by using Digital Multimeter, Programmable Timer/Counter, Accelerometer and Measuring Amplifier which maintained by the Calibration Laboratory Co., Ltd.

REFERENCE STANDARD USED :

- Digital Multimeter, Hewlett Packard Model 34401A S/N. 3146A75935.
- Programmable Timer/Counter, Philips Model PM6680B S/N. SM607101.
- Accelerometer with Measuring Amplifier, Briel & Kjaer Model 8305, 2626 S/N. 705491, 1741406.

TRACEABILITY :

- The measurements are traceable to International System of Units (SI), through National Institute of Metrology (Thailand) Certificate No. EE-0130-23, Due Date 29 November 2024.
- The measurements are traceable to International System of Units (SI), through Aeronautical Radio of Thailand Ltd. Certificate No. 07-0050/24, Due Date 13 May 2025.
- The measurements are traceable to International System of Units (SI), through National Institute of Metrology (Thailand) Certificate No. AV-0053-23, Due Date 12 October 2024.

UNCERTAINTY :

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2.00$ which for a normal distribution corresponds to a coverage probability of approximately 95 %. It has been evaluated according to the "Evaluation of the Uncertainty of Measurement in Calibration (EA-4/02 M:2022)"





Certificate No.: C2409-0836

Environmental conditions: Pressure: 101.325 kPa Temperature: 23.0 °C Relative humidity: 50 %RH
Reference conditions: Measurement conditions: 100.90 ± 0.01 kPa 23.2 ± 1.1 °C 58.2 ± 2.3 %RH

1. Sound pressure level

Specified sound pressure level (dB)	Measured sound pressure level (dB)	Deviated value (dB)	Tolerance limit IEC60942:2017 Class 1 (dB)
94.00	93.93	0.07	±0.25
114.00	114.01	0.01	±0.25

2. Frequency

Specified Frequency (Hz)	Measured Frequency (Hz)	Deviated value (%)	Tolerance limit IEC60942:2017 Class 1 (%)
1000.00	1000.30	0.03	±0.7
1000.00	1000.18	0.02	±0.7

3. Total distortion + Noise

Specified sound pressure level (dB)	Measured Distortion (%)	Tolerance limit IEC60942:2017 Class 1 (%)
94.00	0.50	±2.5
114.00	1.10	±2.5

Uncertainty of measurement

Parameters	Uncertainty
Sound pressure level	0.10 dB
Frequency	0.020 %
Total distortion + Noise	0.10 %

Date of calibration: 2024-09-30
Date of issue: 2024-10-02



Acoustic Laboratory (Thailand) Co., Ltd.
6/57 Soi Phomsin Soi 42, Sai Mai, Sai Mai, Bangkok 10220
Tel: (+66) 02-1296780 Email: info@altbkk.com



Certificate of Calibration

Certificate No.: C2409-0836

Customer: ENVIRONMENTAL MEASUREMENTS CO., LTD.
5/45 Baan Klang Krung Biz Town, Soi Srinagarindra
46/1 (Pramote), NONG BON Sub-district,
PRAWET District, BANGKOK 10250

Date of calibration: 2024-09-30
Date of issue: 2024-10-02
Instrument Calibrated: Sound Calibrator
Manufacturer: BSWA
Type: CA111
Serial no: 550482

Calibration and verification performed:

The performed tests refer to IEC 60942 (2017): Electro-acoustics - Sound Calibrators. The calibrator has been tested as described in Annex B of the same standard.

Preconditioning:

The equipment was preconditioned for more than 16 hours at the specified calibration temperature and humidity

Instruments and Program:

A complete list of instruments, hardware, and software, that has been used for this calibration is separately available from the calibration laboratory.

Equipment standards used:

-Sound Measuring Equipment Calibration Unit 483B S/N31083
-Digital Multimeter Keysight S/N HP34401A
-Ultra-low Distortion Function Generator Stanford SRS DS360 S/N123625
-Acoustic Sound Calibrator Class 0 Nor1253 S/N32941
-Reference Microphone Condenser G.R.A.S. 40AU-1 S/N309231
-Sound Analyser Nor140 S/N1405248
-Combined Pressure, Humidity and Temperature Transmitter PTU300 S/NM2520568

Traceability

The measured values are traceable to following the ISO/IEC 17025 laboratories:

Sound Pressure Level: NCL, Norway
Reference microphone: NCL, Norway
Voltage: TPA, Thailand
Frequency: TPA, Thailand
Reference Pressure, Humidity and Temperature: TPA, Thailand
Distortion Meter: EEI, Thailand

This certificate of calibration is issued by Acoustic Laboratory Thailand (ALT). It also states that the laboratory has a satisfactory quality assurance system and traceability to accredited or national calibration laboratories. This certificate may not be reproduced other than in full.



Request No. : 22-68 / 0059

MTC No. : PSL-P 0019 / 68

CERTIFICATE OF CALIBRATION

Nomenclature : Digital Lux Meter

Serial No. : A.067438

Maker : EXTECH Instruments

Model : 407026

Customer : ENVIRONMENTAL MEASUREMENTS CO., LTD.

Address : 5/45 Baan Klang Krung Biz Town, Soi Srinagarindra 46/1 (Pramote), Nong Bon Sub-District

Prawet District, Bangkok 10250

Date of receipt : 28 October 2024

Date of calibration : 4 November 2024

Place of calibration : Photometry and Temperature Standards Laboratory, MTC. (Bangpoo)

Basis of calibration : calibration at 0 ~ 5000 lux.

Condition of calibration : - Ambient temperature : $(25 \pm 2) ^\circ\text{C}$

- Relative humidity : $(60 \pm 20) \%$

Reference Standard : Working Standard Luminous Intensity Lamp, Serial No.: FEL003 and 3501, can be traceable to international system of units (SI), through calibration certificate MTC No. PSL-P 0151/67 and PSL-P 0152/67, date of calibration 10 May 2024.

Traceability : This certificate is traceable to SI units through the National Institute of Metrology (Thailand) calibration certificate No. TP-1010-23, TP-1011-23 and TP-1012-23

Support Equipment : 1. Photometric bench , 3.0 meter long

2. DC power supply, Serial No.: BC - 341006035007/2

3. Digital Multimeter , Model : R 6551 , S/N : 92041186 and 92041192

Calibration Procedure : The measurement was done in accordance with WI.CP.10.

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

page 1 of 2

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

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Tel. (66) 0 2577 9036
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Office/Laboratory
668 Mu 2 Tambon Bangpoomai, Amphoe Muang Samutprakan,
Changwat Samutprakan 10280, Thailand
Tel. (66) 0 2323 1672-80 ext. 115, 116
(66) 08 3219 9440
E-mail : mtc@tistr.or.th Website : www.tistr.or.th

Office
196 Phahonyothin Road, Ladao, Chatchak,
Bangkok 10900, Thailand
Tel. (66) 0 2579 1121-30 ext. 5219, 5225, 5217
(66) 08 1889 6827

FM.BLMTC.002 Rev.5

MM-S12



Certificate No.: C2409-0836

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

Calibrated By: [REDACTED]

Approved By: [REDACTED]

Date of calibration: 2024-09-30
Date of issue : 2024-10-02

End of Calibration Certificate



Registration number 010556406235
637 Poemai Soi 42, Sai Mai, 10220 Bangkok Thailand
Tel (+66) 02-1296780 Email: info@altbkk.com
www.altbkk.com

Certificate of Calibration

Certificate No.: S2409-0833

Customer:

ENVIRONMENTAL MEASUREMENTS CO., LTD.
5/45 Baan Klang Krung Biz Town, Soi Srinagarindra
46/1 (Pramote), NONG BON Sub-district,
PRAWET District, BANGKOK 10250

Date of calibration:

2024-10-01

Date of issue:

2024-10-02

Instrument Calibrated:

Noise Dosimeter

Manufacturer:

SOUNDTEK

Model:

ST-130

Serial no:

170800130

Calibration and verification performed:

Acoustical levels are stated relative to 20µPa. Other dB levels are relative values.
The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k , which with the reported effective degree of freedom corresponds to coverage probability of approximately 95%.

The sound level meter instrument submitted for periodic testing following the periodic tests of IEC 61672-3 : 2013.

Preconditioning:

The equipment was preconditioned for more than 16 hours at the specified calibration temperature and humidity.

Instruments and Program:

A complete list of instruments, hardware, and software, that has been used for this calibration is separately available from the calibration laboratory.

Equipment standards used:

- Sound measuring equipment calibration unit Nor140 S/N1405248
- Acoustic sound calibrator class 1 Nor1256 S/N125626542
- Combined Pressure, Humidity and Temperature Transmitter PTU300 S/NM2520568

Traceability

The measured values are traceable to following the ISO/IEC 17025 laboratories:

Sound Pressure Level: EEI, Thailand

Reference Pressure, Humidity and Temperature: TPA, Thailand

Request No. : 22-68 / 0059

Serial No. : A.067438

MTC No. : PSL-P 0019 / 68

Results :

UUC Range (lux)	Standard (lux)	*UUC Reading Before Adj.(lux)	UUC Reading After Adj.(lux)	Uncertainty of Measurement ± (lux)
2000	100	103	104	2.0
	500	502	505	10
	1000	992	1000	20
	1500	1486	1497	30
	2000	1972	1994	40
20000 (×10)	2000	197	200	40
	3000	296	300	60
	4000	391	397	80
	5000	490	497	100

Note : *UUC = Unit Under Calibration.

...end of certificate...

Calibrated by :



Photometry and Temperature Standards Laboratory

Ref. : 2012267102803899001

Issued date : 4 November 2024

page 2 of 2

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

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

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196 Phahonyothin Road, Ladoyao, Chatuchak,
Bangkok 10900, Thailand
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(66) 08 1889 6827

FM.BL.MTC.002 Rev.5

E-mail : mtc@tistr.or.th Website : www.tistr.or.th

C-Weighting acoustic frequency response meter free-field acoustic response at a level of 80.0 dB

Frequency Weighting (Hz)	Deviation from various frequency weighting response curve	
	C-Weighting (dB)	Acceptance limit (dB)
125	0.4	±1.5
1000	0.0	±1.0
8000	1.3	±5.0

Note: Acoustical signal test of frequency weightings are not accredited

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

Calibrated By: ()
Approved By: ()

Date of calibration : 2024-10-01
Date of issue : 2024-10-02

----- End of Calibration Certificate -----

Environmental conditions: Pressure: 101.325 kPa Temperature: 23.0 °C Relative humidity: 50 %RH
Reference conditions: 100.78 ± 0.10 kPa 22.9 ± 0.5 °C 52.5 ± 5.0 %RH
Measurement conditions:

1. Indication at the calibration check frequency

Reference Acoustic Signal (dB)	Measured value (dB)		Deviated value (dB)	Uncertainty (dB)	Acceptance limit (dB)
	Before adjust	After adjust			
93.9	94.1	93.9	0.0	0.12	±1.0

Note: Indication at the checked calibration frequency was adjusted to 93.9 dB by the sound calibrator BSWA model CA111 S/N:550482

2. Frequency Weighting at 1 kHz

Frequency Weighting	Measured value (dB)	Deviated value (dB)	Uncertainty (dB)	Acceptance limit (dB)
A-Weighting	94.0	0.0	0.20	±0.3
C-Weighting	94.0	0.0	0.20	±0.3

Note: Frequency weighting at 1 kHz are not accredited

3. Time Weighting at 1 kHz

Time Weighting	Measured value (dB)	Deviated value (dB)	Uncertainty (dB)	Acceptance limit (dB)
Fast	94.0	0.0	0.20	±0.3
Slow	94.0	0.0	0.20	±0.3

Note: Time Weighting at 1 kHz are not accredited

4. Acoustical signal test of frequency weightings

A-Weighting acoustic frequency response meter free-field acoustic response at a level of 80.0 dB

Frequency Weighting (Hz)	Deviation from various frequency weighting response curve	
	A-Weighting (dB)	Acceptance limit (dB)
125	0.2	±1.5
1000	0.0	±1.0
8000	0.6	±5.0

Note: Acoustical signal test of frequency weightings are not accredited

Date of calibration : 2024-10-01
Date of issue : 2024-10-02

Environmental conditions: Pressure: 101.325 kPa Temperature: 23.0 °C Relative humidity: 50 %RH
Reference conditions: 100.38 ± 0.50 kPa 23.0 ± 0.5 °C 53.4 ± 5.0 %RH
Measurement conditions:

1. Indication at the calibration check frequency

Reference Acoustic Signal (dB)	Measured value (dB)		Deviated value (dB)	Uncertainty (dB)	Acceptant limit (dB)
	Before adjust	After adjust			
93.9	94.1	93.9	0.0	0.12	±1.0

Note: Indication at the checked calibration frequency was adjusted to 93.9 dB by the sound calibrator BSWA model:CA111 SN:550482

2. Frequency Weighting at 1 kHz

Frequency Weighting	Measured value (dB)	Deviated value (dB)	Uncertainty (dB)	Acceptance limit (dB)
A-Weighting	94.0	0.0	0.20	±0.3
C-Weighting	93.9	0.0	0.20	±0.3

Note: Frequency weighting at 1 kHz are not accredited

3. Time Weighting at 1 kHz

Time Weighting	Measured value (dB)	Deviated value (dB)	Uncertainty (dB)	Acceptance limit (dB)
Fast	94.0	0.0	0.20	±0.3
Slow	94.0	0.0	0.20	±0.3

Note: Time Weighting at 1 kHz are not accredited

4. Acoustical signal test of frequency weightings

A-Weighting acoustic frequency response meter free-field acoustic response at a level of 80.0 dB

Frequency Weighting (Hz)	Deviation from various frequency weighting response curve		Acceptance limit (dB)
	A-Weighting (dB)	Uncertainty (dB)	
125	0.1	0.20	±1.5
1000	0.0	0.20	±1.0
8000	1.9	0.20	±5.0

Note: Acoustical signal test of frequency weightings are not accredited

Date of calibration : 2024-10-01
Date of issue : 2024-10-02

Certificate of Calibration

Certificate No.: S2409-0834

Customer:

ENVIRONMENTAL MEASUREMENTS CO., LTD.
5/45 Baan Klang Krung Biz Town, Soi Srinagarindra
46/1 (Pramote), NONG BON Sub-district,
PRAWET District, BANGKOK 10250

Date of calibration:

2024-10-01

Date of issue:

2024-10-02

Instrument Calibrated:

Noise Dosimeter

Manufacturer:

SOUNDTEK

Model:

ST-130

Serial no:

170800167

Calibration and verification performed:

Acoustical levels are stated relative to 20µPa. Other dB levels are relative values.
The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k, which with the reported effective degree of freedom corresponds to coverage probability of approximately 95%.

The sound level meter instrument submitted for periodic testing following the periodic tests of IEC 61672-3 : 2013.

Preconditioning:

The equipment was preconditioned for more than 16 hours at the specified calibration temperature and humidity.

Instruments and Program:

A complete list of instruments, hardware, and software, that has been used for this calibration is separately available from the calibration laboratory.

Equipment standards used:

- Sound measuring equipment calibration unit Nor140 S/N1405248
- Acoustic sound calibrator class 1 Nor1256 S/N125626542
- Combined Pressure, Humidity and Temperature Transmitter PTU300 S/NM2520568

Traceability

The measured values are traceable to following the ISO/IEC 17025 laboratories:
Sound Pressure Level: EEI, Thailand
Reference Pressure, Humidity and Temperature: TPA, Thailand

Certificate of Calibration

Certificate No.: S2409-0835

Customer:

ENVIRONMENTAL MEASUREMENTS CO., LTD.
5/45 Baan Klang Krung Biz Town, Soi Srinagarindra
46/1 (Pramote), NONG BON Sub-district,
PRAWET District, BANGKOK 10250

Date of calibration:

2024-10-01

Date of issue:

2024-10-02

Instrument Calibrated:

Noise Dosimeter

Manufacturer:

SOUNDTEK

Model:

ST-130

Serial no:

170800266

Calibration and verification performed:

Acoustical levels are stated relative to 20µPa. Other dB levels are relative values.

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k , which with the reported effective degree of freedom corresponds to coverage probability of approximately 95%.

The sound level meter instrument submitted for periodic testing following the periodic tests of IEC 61672-3 : 2013.

Preconditioning:

The equipment was preconditioned for more than 16 hours at the specified calibration temperature and humidity.

Instruments and Program:

A complete list of instruments, hardware, and software, that has been used for this calibration is separately available from the calibration laboratory.

Equipment standards used:

- Sound measuring equipment calibration unit Nor140 S/N1405248
- Acoustic sound calibrator class 1 Nor1256 S/N125626542
- Combined Pressure, Humidity and Temperature Transmitter PTU300 S/NM2520568

Traceability

The measured values are traceable to following the ISO/IEC 17025 laboratories:

Sound Pressure Level: EEL, Thailand

Reference Pressure, Humidity and Temperature: TPA, Thailand

Certificate No.: S2409-0834

C-Weighting acoustic frequency response meter free-field acoustic response at a level of 80.0 dB

Frequency Weighting (Hz)	Deviation from various C-Weighting (dB)	Uncertainty (dB)	Acceptance limit (dB)
125	1.0	0.20	±1.5
1000	-0.1	0.20	±1.0
8000	2.5	0.20	±5.0

Note: Acoustical signal test of frequency weightings are not accredited

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



Calibrated



Approved By:

Date of calibration : 2024-10-01

Date of issue : 2024-10-02

----- End of Calibration Certificate -----

C-Weighting acoustic frequency response meter free-field acoustic response at a level of 80.0 dB

Frequency Weighting (Hz)	Deviation from various frequency weighting response curve		Acceptance limit (dB)
	C-Weighting (dB)	Uncertainty (dB)	
125	0.5	0.20	±1.5
1000	0.3	0.20	±1.0
8000	4.5	0.20	±5.0

Note: Acoustical signal test of frequency weightings are not accredited

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

Approved By:

Date of calibration : 2024-10-01
Date of issue : 2024-10-02

----- End of Calibration Certificate -----

Environmental conditions: Pressure: 101.325 kPa Temperature: 23.0 °C Relative humidity: 50 %RH
Reference conditions: 100.38 ± 0.50 kPa 23.0 ± 0.5 °C 53.4 ± 5.0 %RH
Measurement conditions:

1. Indication at the calibration check frequency

Reference Acoustic Signal (dB)	Measured value (dB)		Deviated value (dB)	Uncertainty (dB)	Acceptant limit (dB)
	Before adjust	After adjust			
93.9	94.1	93.9	0.0	0.12	±1.0

Note: Indication at the checked calibration frequency was adjusted to 93.9 dB by the sound calibrator BSWA model CA111 S/N:550482

2. Frequency Weighting at 1 kHz

Frequency Weighting	Measured value (dB)	Deviated value (dB)	Uncertainty (dB)	Acceptance limit (dB)
A-Weighting	94.0	0.0	0.20	±0.3
C-Weighting	94.1	0.0	0.20	±0.3

Note: Frequency weighting at 1 kHz are not accredited

3. Time Weighting at 1 kHz

Time Weighting	Measured value (dB)	Deviated value (dB)	Uncertainty (dB)	Acceptance limit (dB)
Fast	94.0	0.0	0.20	±0.3
Slow	94.0	0.0	0.20	±0.3

Note: Time Weighting at 1 kHz are not accredited

4. Acoustical signal test of frequency weightings

A-Weighting acoustic frequency response meter free-field acoustic response at a level of 80.0 dB

Frequency Weighting (Hz)	Deviation from various frequency weighting response curve		Acceptance limit (dB)
	A-Weighting (dB)	Uncertainty (dB)	
125	0.9	0.20	±1.5
1000	0.2	0.20	±1.0
8000	3.3	0.20	±5.0

Note: Acoustical signal test of frequency weightings are not accredited

Date of calibration : 2024-10-01
Date of issue : 2024-10-02

Environmental conditions: Pressure: 101.325 kPa
Reference conditions: 23.0 °C
Measurement conditions: 100.38 ± 0.50 kPa
Relative humidity: 50 %RH
53.4 ± 5.0 %RH

1. Indication at the calibration check frequency

Reference Acoustic Signal (dB)	Measured value		Deviated value (dB)	Uncertainty (dB)	Acceptance limit (dB)
	Before adjust	After adjust			
93.9	93.8	93.9	0.0	0.12	±1.0

Note: Indication at the checked calibration frequency was adjusted to 93.9 dB by the sound calibrator BSWA model:CA111 S/N:550482

2. Frequency Weighting at 1 kHz

Frequency Weighting	Measured value (dB)	Deviated value (dB)	Uncertainty (dB)	Acceptance limit (dB)
A-Weighting	94.0	0.0	0.20	±0.3
C-Weighting	94.0	0.0	0.20	±0.3

Note: Frequency weighting at 1 kHz are not accredited

3. Time Weighting at 1 kHz

Time Weighting	Measured value (dB)	Deviated value (dB)	Uncertainty (dB)	Acceptance limit (dB)
Fast	94.0	0.0	0.20	±0.3
Slow	94.0	0.0	0.20	±0.3

Note: Time Weighting at 1 kHz are not accredited

4. Acoustical signal test of frequency weightings

A-Weighting acoustic frequency response meter free-field acoustic response at a level of 80.0 dB

Frequency Weighting (Hz)	Deviation from various frequency weighting response curve		Acceptance limit (dB)
	A-Weighting (dB)	Uncertainty (dB)	
125	-0.7	0.20	±1.5
1000	0.0	0.20	±1.0
8000	-0.4	0.20	±5.0

Note: Acoustical signal test of frequency weightings are not accredited

Date of calibration : 2024-10-02
Date of issue : 2024-10-03

Certificate of Calibration

Certificate No.: S2409-0831

Customer: ENVIRONMENTAL MEASUREMENTS CO., LTD.
5/45 Baan Klang Kung Biz Town, Soi Srinagarindra
46/1 (Pranote), NONG BON Sub-district,
PRA WET District, BANGKOK 10250

Date of calibration: 2024-10-02
Date of issue: 2024-10-03
Instrument Calibrated: Noise Dosimeter
Manufacturer: SOUNDTEK
Model: ST-130
Serial no: 170800271

Calibration and verification performed:

Acoustical levels are stated relative to 20µPa. Other dB levels are relative values.
The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k, which with the reported effective degree of freedom corresponds to coverage probability of approximately 95%.

The sound level meter instrument submitted for periodic testing following the periodic tests of IEC 61672-3 : 2013.

Preconditioning:

The equipment was preconditioned for more than 16 hours at the specified calibration temperature and humidity.

Instruments and Program:

A complete list of instruments, hardware, and software, that has been used for this calibration is separately available from the calibration laboratory.

Equipment standards used:

- Sound measuring equipment calibration unit Nor140 S/N1405248
- Acoustic sound calibrator class 1 Nor1256 S/N125626542
- Combined Pressure, Humidity and Temperature Transmitter PTU300 S/NM2520568

Traceability

The measured values are traceable to following the ISO/IEC 17025 laboratories:
Sound Pressure Level: EEI, Thailand
Reference Pressure, Humidity and Temperature: TPA, Thailand



Acoustic Laboratory (Thailand) Co., Ltd.
6/57 Soi Phoom Sin 42, Sai Mai, Sai Mai, Bangkok 10220
Tel: (+66) 02-1296780 Email: info@altbkk.com



MM-S12

Certificate of Calibration

Certificate No.: S2409-0832

Customer:

ENVIRONMENTAL MEASUREMENTS CO., LTD.
5/45 Baan Klang Krung Biz Town, Soi Srinagarindra
46/1 (Pramote), NONG BON Sub-district,
PRAWET District, BANGKOK 10250

Date of calibration:

2024-10-01

Date of issue:

2024-10-02

Instrument Calibrated:

Noise Dosimeter

Manufacturer:

SOUNDTEK

Model:

ST-130

Serial no:

170800288

Calibration and verification performed:

Acoustical levels are stated relative to 20 μ Pa. Other dB levels are relative values.

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k , which with the reported effective degree of freedom corresponds to coverage probability of approximately 95%.

The sound level meter instrument submitted for periodic testing following the periodic tests of IEC 61672-3 : 2013.

Preconditioning:

The equipment was preconditioned for more than 16 hours at the specified calibration temperature and humidity.

Instruments and Program:

A complete list of instruments, hardware, and software, that has been used for this calibration is separately available from the calibration laboratory.

Equipment standards used:

- Sound measuring equipment calibration unit Nor140 S/N1405248
- Acoustic sound calibrator class 1 Nor1256 S/N125626542
- Combined Pressure, Humidity and Temperature Transmitter PTU300 S/NM2520568

Traceability

The measured values are traceable to following the ISO/IEC 17025 laboratories:

Sound Pressure Level: EEI, Thailand
Reference Pressure, Humidity and Temperature: TPA, Thailand

This certificate of calibration is issued by Acoustic Laboratory Thailand (ALT). It also states that the laboratory has a satisfactory quality assurance system and traceability to accredited or national calibration laboratories. This certificate may not be reproduced other than in full.



Certificate No.: S2409-0831

C-Weighting acoustic frequency response meter free-field acoustic response at a level of 80.0 dB

Frequency Weighting (Hz)	Deviation from various frequency weighting response curve		Acceptance limit (dB)
	C-Weighting (dB)	Uncertainty (dB)	
125	-0.1	0.20	± 1.5
1000	0.0	0.20	± 1.0
8000	-0.3	0.20	± 5.0

Note: Acoustical signal test of frequency weightings are not accredited

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

Calibrated By

Approved By

Date of calibration : 2024-10-02

Date of issue : 2024-10-03

----- End of Calibration Certificate -----

C-Weighting acoustic frequency response meter free-field acoustic response at a level of 80.0 dB

Frequency Weighting (Hz)	Deviation from various frequency weighting response curve	
	C-Weighting (dB)	Acceptance limit (dB)
125	0.1	±1.5
1000	0.1	±1.0
8000	3.0	±5.0

Note: Acoustical signal test of frequency weightings are not accredited

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

Calibrated By: [Redacted] Approved By: [Redacted]

Date of calibration : 2024-10-01
Date of issue : 2024-10-02

----- End of Calibration Certificate -----

Environmental conditions: Pressure: 101.325 kPa Temperature: 23.0 °C Relative humidity: 50 %RH
Reference conditions: 100.38 ± 0.50 kPa 23.0 ± 0.5 °C 53.4 ± 5.0 %RH
Measurement conditions:

1. Indication at the calibration check frequency

Reference Acoustic Signal (dB)	Measured value (dB)		Deviated value (dB)	Uncertainty (dB)	Acceptance limit (dB)
	Before adjust	After adjust			
93.9	93.6	93.9	0.0	0.12	±1.0

Note: Indication at the checked calibration frequency was adjusted to 93.9 dB by the sound calibrator BSWA model CA111 SN:550482

2. Frequency Weighting at 1 kHz

Frequency Weighting	Measured value (dB)	Deviated value (dB)	Uncertainty (dB)	Acceptance limit (dB)
A-Weighting	94.0	0.0	0.20	±0.3
C-Weighting	94.1	0.0	0.20	±0.3

Note: Frequency weighting at 1 kHz are not accredited

3. Time Weighting at 1 kHz

Time Weighting	Measured value (dB)	Deviated value (dB)	Uncertainty (dB)	Acceptance limit (dB)
Fast	94.0	0.0	0.20	±0.3
Slow	94.1	0.1	0.20	±0.3

Note: Time Weighting at 1 kHz are not accredited

4. Acoustical signal test of frequency weightings

A-Weighting acoustic frequency response meter free-field acoustic response at a level of 80.0 dB

Frequency Weighting (Hz)	Deviation from various frequency weighting response curve	
	A-Weighting (dB)	Acceptance limit (dB)
125	0.0	±1.5
1000	-0.2	±1.0
8000	2.2	±5.0

Note: Acoustical signal test of frequency weightings are not accredited

Date of calibration : 2024-10-01
Date of issue : 2024-10-02



ନିଉନ ୦୩୦୦(୧)/ ୯୩ ୩୯ ।

กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท
เขตราชเทวี กรุงเทพฯ ๑๐๔๐๐

๐๓ พฤษภาคม ๒๕๖๓

เรื่อง เปลี่ยนแปลงบุคลากร สามารถพิชิตวัฏจักรที่แสนยากลำบากของวัฏจักรสามเพศ

อ้างถึง ๑. คำขอขานพระเป็นพระยอมต่ออายุ/เปลี่ยนแปดลูกสาวกร และชนิดสามารถพิชของห้องปฏิบัติการวิเคราะห์เอกชน
ลงวันที่ ๔ มีนาคม ๒๕๖๗

๒. คำขอชนะเบี่ยงต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารพิษของห้องปฏิบัติการวิเคราะห้เอกซน

ลงวันที่ ๑๒ มีนาคม ๒๕๖๓

สิ่งที่ผมมาด้วย เอกสารแบบท้ายหนังสือเปลี่ยนแปลงบุคลากร สามารถที่จะวิเคราะห์และเอกสารอ้างอิง

วิธีวิเคราะห์สารมลพิษ บริษัท ยูเนเต็ด แอมนาลิสต์ แอนด์ เอ็นจิเนียริง คอนซัลแตนท์ จำกัด
จำนวน ๑๙ แผ่น

ตามคำชี้แจงที่อ้างถึง ๑ และ ๒ บริษัท ยูนิคัล แอมบาสிடรี แอนด์ เอ็นจิเนียริ่ง คอร์ปอเรชั่น จำกัด
ต้องปฏิบัติตามการวิเคราะห์ความเสี่ยงทางเทคโนโลยีที่ ๓ ของอนุสัญญา ๔๑ ถนนสุขุมวิท แขวงบางจาก
ของสหประชาชาติ กรุงเทพมหานคร ขอเปลี่ยนแปลงหลักการ สามารถที่จะวิเคราะห์และเอกสารอ้างอิงวิธีวิเคราะห์
สามารถพิจารณาความละเอียดแล้ว นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว มีความเห็นให้เปลี่ยนแปลงดังนี้

๑. ๑. โยกเลิกเจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๒ ราย
ทะเบียนเลขที่ ๖-๑๔๕๕-จ-๐๑๓๓
- ๒) [REDACTED] ทะเบียนเลขที่ ๖-๑๔๕๕-จ-๐๑๕๕
๒. ๒. ให้เพิ่มผู้ควบคุมห้องปฏิบัติการวิเคราะห์เอกชน จำนวน ๑ ราย
ทะเบียนเลขที่ ๖-๑๔๕๕-จ-๐๑๕๕
- ให้เพิ่มเจ้าหน้าที่ห้องปฏิบัติการวิเคราะห์เอกชน จำนวน ๒๗ ราย
ทะเบียนเลขที่ ๖-๑๔๕๕-จ-๐๑๓๓

๓. ให้เพิ่มเจ้าหน้าที่ห้องปฏิบัติการวิเคราะห์เอกชน จำนวน ๒๗ ราย

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|-----|---------------|--------------|
| ๑) | ทะเบียนเลขที่ | ว-๑๔๕-จ-๐๑๕๕ |
| ๒) | ทะเบียนเลขที่ | ว-๑๔๕-จ-๐๑๕๕ |
| ๓) | ทะเบียนเลขที่ | ว-๑๔๕-จ-๐๑๖๐ |
| ๔) | ทะเบียนเลขที่ | ว-๑๔๕-จ-๐๑๖๑ |
| ๕) | ทะเบียนเลขที่ | ว-๑๔๕-จ-๐๑๖๒ |
| ๖) | ทะเบียนเลขที่ | [REDACTED] |
| ๗) | ทะเบียนเลขที่ | ว-๑๔๕-จ-๐๑๖๓ |
| ๘) | ทะเบียนเลขที่ | ว-๑๔๕-จ-๐๑๖๓ |
| ๙) | ทะเบียนเลขที่ | ว-๑๔๕-จ-๐๑๖๓ |
| ๑๐) | ทะเบียนเลขที่ | ว-๑๔๕-จ-๐๑๖๓ |
| ๑๑) | ทะเบียนเลขที่ | ว-๑๔๕-จ-๐๑๖๓ |

๑๒) นางสาวปวีณา...

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|----|------------------------------|
| ๖๒ | ทะเบียนเลขที่ ๖-๑๔๕๕-จ-๐๑๑๖ |
| ๖๓ | ทะเบียนเลขที่ ๖-๑๔๕๕-จ-๐๑๑๗ |
| ๖๔ | ทะเบียนเลขที่ ๖-๑๔๕๕-จ-๐๑๑๗๑ |
| ๖๕ | ทะเบียนเลขที่ ๖-๑๔๕๕-จ-๐๑๑๗๒ |
| ๖๖ | ทะเบียนเลขที่ ๖-๑๔๕๕-จ-๐๑๑๗๓ |
| ๖๗ | ทะเบียนเลขที่ ๖-๑๔๕๕-จ-๐๑๑๗๔ |
| ๖๘ | ทะเบียนเลขที่ ๖-๑๔๕๕-จ-๐๑๑๗๕ |
| ๖๙ | ทะเบียนเลขที่ ๖-๑๔๕๕-จ-๐๑๑๗๖ |
| ๗๐ | ทะเบียนเลขที่ ๖-๑๔๕๕-จ-๐๑๑๗๗ |
| ๗๑ | ทะเบียนเลขที่ ๖-๑๔๕๕-จ-๐๑๑๗๘ |
| ๗๒ | ทะเบียนเลขที่ ๖-๑๔๕๕-จ-๐๑๑๗๙ |
| ๗๓ | ทะเบียนเลขที่ ๖-๑๔๕๕-จ-๐๑๑๘๐ |
| ๗๔ | ทะเบียนเลขที่ ๖-๑๔๕๕-จ-๐๑๑๘๑ |
| ๗๕ | ทะเบียนเลขที่ ๖-๑๔๕๕-จ-๐๑๑๘๒ |
| ๗๖ | ทะเบียนเลขที่ ๖-๑๔๕๕-จ-๐๑๑๘๓ |

๒๖ [REDACTED] ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๘๔

๔. ให้ยกเลิกข้อรายการการสารพัดขึ้นเสีย^๑ นี้ไว้ก่อน และสิ่งปฏิกรหรือวัตถุขึ้นเสีย^๒ ให้โดยตามรายการเอกสารแนบท้ายหนังสือที่ออกอยู่ซึ่งระเบียบห้องปฏิบัติการวิเคราะห์เอกชน ที่ อก ๐๓๑๐(๑)/๑๘๘๙ ลงวันที่ ๙ กุมภาพันธ์ ๒๕๖๕

๕. ให้วิเคราะห์สามเหลี่ยมด้านขวาที่ได้รับทักษะเขียนให้วิเคราะห์ในหน่วยการเรียนรู้ และแลกเปลี่ยนเรียนรู้กับเพื่อนในชั้นเรียน

อนึ่ง หนังสือฉบับจะหมดอายุพร้อมหนังสือต่ออายุรับทะเบียนของปฏิทินการวิเคราะห์เอกชน
ในวันที่ ๒ กุมภาพันธ์ ๒๕๖๘

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ



อธิบดีกรมโรงงานอุตสาหกรรม

YIAE
YOUNG IN ARCHITECTURE & ENGINEERING
YOUNG IN ARCHITECTURE & ENGINEERING
YOUNG IN ARCHITECTURE & ENGINEERING

ตามฤดูกาล

กองวิจัยและเตือนภัยมลพิษโรงงาน

กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบ

โทร. ๐ ๒๔๓๐ ๖๓๓๒ ถึง ๒๑๐๓-๕

โทรสาร ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๘๙

ไปรษณีย์อิเล็กทรอนิกส์ saraban@diw.mail.go.th



"อุตสาหกรรมก้าวไกล ประเทศไทยก้าวหน้า รวมกันพัฒนา อุตสาหกรรมสีเขียว"



๑๒) นางสาวปวีณา...

เอกสารแนบท้ายหนังสือเปลี่ยนแปลงผลการ สามารถพิพม์ที่วิเคราะห์และเอกสารอ้างอิงวิธีวิเคราะห์สารมลพิษ
บริษัท ยูนิเทค แอเนมาลิสส์ แอนด์ เอ็นจิเนียริ่ง คอนซัลแตนท์ จำกัด เลขทะเบียน ๖-๑๔๔
ที่ กก ๐๓๑๐(๑)/ ๔ ๓ ๕ | ลงวันที่ ๐๓ พฤษภาคม ๒๕๖๓

ขอช่วยสารมลพิษที่ได้รับขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๒๐๗ รายการ

แนบท้าย จำนวน ๔๖ รายการ

ลำดับ	สารมลพิษ	วิธีวิเคราะห์
17	4,4'-DDD	Liquid-Liquid Extraction, Gas Chromatographic Method ^[3]
18	4,4'-DDE	Liquid-Liquid Extraction, Gas Chromatographic Method ^[3]
19	4,4'-DDT	Liquid-Liquid Extraction, Gas Chromatographic Method ^[3]
20	Dieldrin	Liquid-Liquid Extraction, Gas Chromatographic Method ^[3]
21	Endosulfan I	Liquid-Liquid Extraction, Gas Chromatographic Method ^[3]
22	Endosulfan II	Liquid-Liquid Extraction, Gas Chromatographic Method ^[3]
23	Endosulfan sulfate	Liquid-Liquid Extraction, Gas Chromatographic Method ^[3]
24	Endrin	Liquid-Liquid Extraction, Gas Chromatographic Method ^[3]
25	Endrin aldehyde	Liquid-Liquid Extraction, Gas Chromatographic Method ^[3]
26	Formaldehyde	Distillation, Colorimetric Method ^[2]
27	Free Chlorine	1) Iodometric Method ^[3] 2) DPD Ferrous Titrimetric Method ^[3]
28	Heptachlor	Liquid-Liquid Extraction, Gas Chromatographic Method ^[3]
29	Heptachlor Epoxide	Liquid-Liquid Extraction, Gas Chromatographic Method ^[3]
30	Hexavalent Chromium	1) Colorimetric Method ^[3] 2) Extraction, Direct Air-Acetylene Flame Method ^[3]
31	Lead	1) Digestion, Direct Air-Acetylene Flame Method ^[3] 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method ^[3]
32	Manganese	3) Digestion, Inductively Coupled Plasma Method ^[3] 1) Digestion, Direct Air-Acetylene Flame Method ^[3] 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method ^[3]
33	Mercury	3) Digestion, Inductively Coupled Plasma Method ^[3] Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ^[3]
34	Methoxychlor	Liquid-Liquid Extraction, Gas Chromatographic Method ^[3]
35	Nickel	1) Digestion, Direct Air-Acetylene Flame Method ^[3] 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method ^[3]
36	Oil & Grease	1) Liquid-Liquid Partitioning ^[3] 2) Soxhlet Extraction Method ^[3]
37	pH	Electrometric Method ^[3]

ลำดับ	สารมลพิษ	วิธีวิเคราะห์
1	Aldrin	Liquid-Liquid Extraction, Gas Chromatographic Method ^[3]
2	Arsenic	1) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^[3] 2) Digestion, Inductively Coupled Plasma Method ^[3] Digestion, Inductively Coupled Plasma Method ^[3]
3	Barium	Liquid-Liquid Extraction, Gas Chromatographic Method ^[3]
4	α-BHC	Liquid-Liquid Extraction, Gas Chromatographic Method ^[3]
5	β-BHC	Liquid-Liquid Extraction, Gas Chromatographic Method ^[3]
6	δ-BHC	Liquid-Liquid Extraction, Gas Chromatographic Method ^[3]
7	γ-BHC	Liquid-Liquid Extraction, Gas Chromatographic Method ^[3]
8	Biochemical Oxygen Demand	1) 5-Day BOD Test, Azide Modification Method ^[3] 2) 5-Day BOD Test, Membrane Electrode Method ^[3]
9	Cadmium	1) Digestion, Direct Air-Acetylene Flame Method ^[3] 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method ^[3]
10	Chemical Oxygen Demand	3) Digestion, Inductively Coupled Plasma Method ^[3] 1) Closed Reflux, Titrimetric Method ^[3] 2) Closed Reflux, Colorimetric Method ^[3] 3) Open Reflux, Titrimetric Method ^[3]
11	Chlordane	Liquid-Liquid Extraction, Gas Chromatographic Method ^[3]
12	Chromium	1) Digestion, Direct Air-Acetylene Flame Method ^[3] 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method ^[3]
13	Color	3) Digestion, Inductively Coupled Plasma Method ^[3] ADMI Weighted-Ordinate Spectrophotometric Method ^[3]
14	Copper	1) Digestion, Direct Air-Acetylene Flame Method ^[3] 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method ^[3]
15	Cyanide	2) Digestion, Electrothermal Atomic Absorption Spectrometric Method ^[3] 3) Digestion, Inductively Coupled Plasma Method ^[3] 1) Distillation, Colorimetric Method ^[3] 2) Flow Injection Analysis Method ^[3]
16	o,p'-DDT	Liquid-Liquid Extraction, Gas Chromatographic Method ^[3]

ลำดับ	สารเคมี	วิธีวิเคราะห์
5	Antimony	Digestion, Inductively Coupled Plasma Method ^[3]
6	Arsenic	1) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^[3] 2) Digestion, Inductively Coupled Plasma Method ^[3]
7	Atrazine	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[3]
8	Barium	1) Digestion, Electrothermal Atomic Absorption Spectrometric Method ^[3] 2) Digestion, Inductively Coupled Plasma Method ^[3]
9	Benz(a)anthracene	1) Liquid-Liquid Extraction, Gas Chromatographic Method ^[3] 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[3]
10	Benzene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ^[3]
11	Benzo(b)fluoranthene	1) Liquid-Liquid Extraction, Gas Chromatographic Method ^[3] 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[3]
12	Benzo(k)fluoranthene	1) Liquid-Liquid Extraction, Gas Chromatographic Method ^[3] 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[3]
13	Benzoic acid	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[3]
14	Benzo(a)pyrene	1) Liquid-Liquid Extraction, Gas Chromatographic Method ^[3] 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[3]
15	Benzo(g,h,i)perylene	1) Liquid-Liquid Extraction, Gas Chromatographic Method ^[3] 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[3]
16	Beryllium	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[3]
17	Bis(2-chloroethyl)ether	Digestion, Inductively Coupled Plasma Method ^[3]
18	Bis(2-ethylhexyl)phthalate	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[3]

19 Bromodichloromethane...

ลำดับ	สารเคมี	วิธีวิเคราะห์
38	Phenols	1) Distillation, Chloroform Extraction Method ^[3] 2) Distillation, Direct Photometric Method ^[3]
39	Selenium	1) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^[3] 2) Digestion, Inductively Coupled Plasma Method ^[3]
40	Sulfide	1) Iodometric Method ^[3] 2) Methylene Blue Method ^[3]
41	Temperature	Laboratory and Field Methods ^[3]
42	Total Dissolved Solids	Dried at 180 °C ^[3]
43	Total Kjeldahl Nitrogen	Semi-Micro-Kjeldahl Method ^[3]
44	Total Suspended Solids	Dried from 103 to 105 °C ^[3]
45	Trivalent Chromium	1) Digestion, Direct Air-Acetylene Flame Method; Colorimetric Method; Calculation ^[3] 2) Digestion, Inductively Coupled Plasma Method; Colorimetric Method; Calculation ^[3] 1) Digestion, Direct Air-Acetylene Flame Method ^[3] 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method ^[3]
46	Zinc	3) Digestion, Inductively Coupled Plasma Method ^[3]

น้ำใต้ดิน จำนวน 126 รายการ

ลำดับ	สารเคมี	วิธีวิเคราะห์
1	Acenaphthene	1) Liquid-Liquid Extraction, Gas Chromatographic Method ^[3] 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[3]
2	Acetone	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ^[3]
3	Aldrin	1) Liquid-Liquid Extraction, Gas Chromatographic Method ^[3] 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[3]
4	Anthracene	1) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[3] 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[3]

5 Antimony...

ลำดับ	สารมลพิษ	วิธีวิเคราะห์
34	Chromium (III)	1) Digestion, Direct Air-Acetylene Flame Method; Colorimetric Method; Calculation ⁽³⁾ 2) Digestion, Inductively Coupled Plasma Method; Colorimetric Method; Calculation ⁽³⁾
35	Chromium (VI)	1) Colorimetric Method ⁽³⁾ 2) Extraction, Air-Acetylene Flame Method ⁽³⁾
36	Chrysene	1) Liquid-Liquid Extraction, Gas Chromatographic Method ⁽³⁾ 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽³⁾
37	Cyanide	Distillation, Colorimetric Method ⁽³⁾
38	2,4-D	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽³⁾
39	DDD	1) Liquid-Liquid Extraction, Gas Chromatographic Method ⁽³⁾ 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽³⁾
40	DDE	1) Liquid-Liquid Extraction, Gas Chromatographic Method ⁽³⁾ 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽³⁾
41	DDT	1) Liquid-Liquid Extraction, Gas Chromatographic Method ⁽³⁾ 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽³⁾
42	Dibenz(a,h)anthracene	1) Liquid-Liquid Extraction, Gas Chromatographic Method ⁽³⁾ 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽³⁾
43	Di-n-butyl phthalate	1) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽³⁾ 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽³⁾
44	1,2-Dichlorobenzene	1) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽³⁾ 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽³⁾
45	1,3-Dichlorobenzene	1) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽³⁾ 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽³⁾
46	1,4-Dichlorobenzene	1) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽³⁾ 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽³⁾
47	3,3'-Dichlorobenzidine	1) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽³⁾ 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽³⁾

48 1,1-Dichloroethane...

ลำดับ	สารมลพิษ	วิธีวิเคราะห์
19	Bromodichloromethane	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽³⁾
20	Bromoform	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽³⁾
21	Butanol	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽³⁾
22	Butyl benzyl phthalate	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽³⁾
23	Cadmium	1) Digestion, Direct Air-Acetylene Flame Method ⁽³⁾ 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method ⁽³⁾ 3) Digestion, Inductively Coupled Plasma Method ⁽³⁾
24	Carbazole	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽³⁾
25	Carbon disulfide	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽³⁾
26	Carbon tetrachloride	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽³⁾
27	Chlordane	1) Liquid-Liquid Extraction, Gas Chromatographic Method ⁽³⁾ 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽³⁾
28	p-Chloroaniline	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽³⁾
29	Chlorobenzene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽³⁾
30	Chlorodibromomethane	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽³⁾
31	Chloroform	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽³⁾
32	2-Chlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽³⁾
33	Chromium	1) Digestion, Direct Air-Acetylene Flame Method ⁽³⁾ 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method ⁽³⁾ 3) Digestion, Inductively Coupled Plasma Method ⁽³⁾

ลำดับ	สารเคมี	วิธีวิเคราะห์
48	1,1-Dichloroethane	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ⁽³⁾
49	1,2-Dichloroethane	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ⁽³⁾
50	1,1-Dichloroethylene	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ⁽³⁾
51	cis-1,2-Dichloroethylene	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ⁽³⁾
52	trans-1,2-Dichloroethylene	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ⁽³⁾
53	2,4-Dichlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽³⁾
54	1,2-Dichloropropane	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ⁽³⁾
55	1,3-Dichloropropane	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ⁽³⁾
56	1,3-Dichloropropane	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ⁽³⁾
57	Dieldrin	1) Liquid-Liquid Extraction, Gas Chromatographic Method ⁽³⁾ 2) Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽³⁾
58	Diethyl phthalate	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽³⁾
59	2,4-Dimethylphenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽³⁾
60	2,4-Dinitrophenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽³⁾
61	2,4-Dinitrotoluene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽³⁾
62	2,6-Dinitrotoluene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽³⁾
63	Di-n-Octyl phthalate	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽³⁾
64	Endosulfan	1) Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽³⁾ 2) Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽³⁾

ลำดับ	สารเคมี	วิธีวิเคราะห์
65	Endrin	1) Liquid-Liquid Extraction, Gas Chromatographic Method ⁽³⁾ 2) Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽³⁾
66	Ethylbenzene	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ⁽³⁾
67	Fluoranthene	1) Liquid-Liquid Extraction, Gas Chromatographic Method ⁽³⁾ 2) Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽³⁾
68	Fluorene	1) Liquid-Liquid Extraction, Gas Chromatographic Method ⁽³⁾ 2) Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽³⁾
69	Heptachlor	1) Liquid-Liquid Extraction, Gas Chromatographic Method ⁽³⁾ 2) Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽³⁾
70	Heptachlor epoxide	1) Liquid-Liquid Extraction, Gas Chromatographic Method ⁽³⁾ 2) Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽³⁾
71	Hexachlorobenzene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽³⁾
72	Hexachloro-1,3-butadiene	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ⁽³⁾
73	n-Hexane	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ⁽³⁾
74	α-HCH	1) Liquid-Liquid Extraction, Gas Chromatographic Method ⁽³⁾ 2) Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽³⁾
75	β-HCH	1) Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽³⁾ 2) Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽³⁾

ลำดับ	สารเคมี	วิธีวิเคราะห์
91	Naphthalene	1) Liquid-Liquid Extraction, Gas Chromatographic Method ⁽³⁾ 2) Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽³⁾
92	Nickel	1) Digestion, Direct Air-Acetylene Flame Method ⁽³⁾ 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method ⁽³⁾
93	Nitrobenzene	3) Digestion, Inductively Coupled Plasma Method ⁽³⁾ Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽³⁾
94	N-Nitrosodiphenylamine	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽³⁾
95	N-Nitrosodi-n-propylamine	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽³⁾
96	Polychlorinated Biphenyls - PCB 1016 - PCB 1221 - PCB 1232 - PCB-1242 - PCB-1248 - PCB-1254 - PCB-1260	1) Liquid-Liquid Extraction, Gas Chromatographic Method ⁽³⁾ 2) Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽³⁾
97	Pentachlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽³⁾
98	pH	Electrometric Method ⁽³⁾
99	Phenanthrene	1) Liquid-Liquid Extraction, Gas Chromatographic Method ⁽³⁾ 2) Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽³⁾
100	Phenol	1) Distillation, Chloroform Extraction Method ⁽³⁾ 2) Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽³⁾
101	Pyrene	1) Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽³⁾ 2) Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽³⁾

ลำดับ	สารเคมี	วิธีวิเคราะห์
76	γ-HCH	1) Liquid-Liquid Extraction, Gas Chromatographic Method ⁽³⁾ 2) Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽³⁾
77	Hexachlorocyclopentadiene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽³⁾
78	Hexachloroethane	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽³⁾
79	Indeno(1,2,3-cd)pyrene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽³⁾
80	Isophorone	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽³⁾
81	Lead	1) Digestion, Direct Air-Acetylene Flame Method ⁽³⁾ 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method ⁽³⁾ 3) Digestion, Inductively Coupled Plasma Method ⁽³⁾
82	Manganese	1) Digestion, Direct Air-Acetylene Flame Method ⁽³⁾ 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method ⁽³⁾ 3) Digestion, Inductively Coupled Plasma Method ⁽³⁾
83	Mercury	Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ⁽³⁾
84	Methanol	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ⁽³⁾
85	Methoxychlor	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽³⁾
86	Methyl bromide	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ⁽³⁾
87	Methylene chloride	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ⁽³⁾
88	2-Methylphenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽³⁾
89	2-Methylnaphthalene	1) Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽³⁾ 2) Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽³⁾
90	Methyl tert-butyl ether	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ⁽³⁾

ลำดับ	สารมลพิษ	วิธีวิเคราะห์
119	Vanadium	Digestion, Inductively Coupled Plasma Method ⁽³⁾
120	Vinyl acetate	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ⁽³⁾
121	Vinyl chloride	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ⁽³⁾
122	m-Xylene	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ⁽³⁾
123	o-Xylene	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ⁽³⁾
124	p-Xylene	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ⁽³⁾
125	Xylene (Total)	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ⁽³⁾
126	Zinc	1) Digestion, Direct Air-Acetylene Flame Method ⁽³⁾ 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method ⁽³⁾ 3) Digestion, Inductively Coupled Plasma Method ⁽³⁾

สิ่งปฏิกูลหรือวัสดุที่ไม่ใช้แล้ว จำนวน 35 รายการ

ลำดับ	สารมลพิษ	วิธีวิเคราะห์
1	Aldrin	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^(1,7,21) 2) Ultrasonic Extraction, Gas Chromatographic Method ^(8,21) Digestion, Inductively Coupled Plasma Method ^(5,12)
2	Antimony	1) Waste Extraction, Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^(1,4,14)
3	Arsenic	2) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,4,12) 3) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^(5,10)
4	Barium	4) Digestion, Inductively Coupled Plasma Method ^(5,12) 1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(5,12) 2) Digestion, Inductively Coupled Plasma Method ^(5,12)

ลำดับ	สารมลพิษ	วิธีวิเคราะห์
102	Selenium	1) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ⁽³⁾ 2) Digestion, Inductively Coupled Plasma Method ⁽³⁾
103	Silver	Digestion, Inductively Coupled Plasma Method ⁽³⁾
104	Styrene	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ⁽³⁾
105	1,1,2,2-Tetrachloroethane	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ⁽³⁾
106	Tetrachloroethylene	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ⁽³⁾
107	Toluene	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ⁽³⁾
108	Toxaphene	1) Liquid-Liquid Extraction, Gas Chromatographic Method ⁽³⁾ 2) Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽³⁾
109	TPH (C ₅ - C ₆)	1) Purge and Trap, Gas Chromatographic Method ^(10,20) 2) Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(10,23)
110	TPH (C ₈ - C ₁₆)	Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^(7,20)
111	TPH (C ₁₆ - C ₃₅)	Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^(7,20)
112	1,2,4-Trichlorobenzene	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ⁽³⁾
113	1,1,1-Trichloroethane	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ⁽³⁾
114	1,1,2-Trichloroethane	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ⁽³⁾
115	Trichloroethylene	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ⁽³⁾
116	2,4,5-Trichlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽³⁾
117	2,4,6-Trichlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽³⁾
118	1,3,5-Trimethylbenzene	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ⁽³⁾

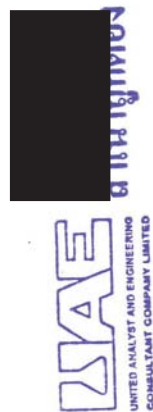
ลำดับ	สารมลพิษ	วิธีวิเคราะห์
12	Copper	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^(1,4,13) 2) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,4,12) 3) Digestion, Flame Atomic Absorption Spectrometric Method ^(5,13) 4) Digestion, Inductively Coupled Plasma Method ^(5,12) 1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^(1,7,21) 2) Ultrasonic Extraction, Gas Chromatographic Method ^(8,21)
13	2,4-D	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^(1,7,21) 2) Ultrasonic Extraction, Gas Chromatographic Method ^(8,21)
14	DDD	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^(1,7,21) 2) Ultrasonic Extraction, Gas Chromatographic Method ^(8,21)
15	DDE	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^(1,7,21) 2) Ultrasonic Extraction, Gas Chromatographic Method ^(8,21)
16	DDT	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^(1,7,21) 2) Ultrasonic Extraction, Gas Chromatographic Method ^(8,21)
17	Dieldrin	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^(1,7,21) 2) Ultrasonic Extraction, Gas Chromatographic Method ^(8,21)
18	Endrin	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^(1,7,21) 2) Ultrasonic Extraction, Gas Chromatographic Method ^(8,21)
19	Heptachlor	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^(1,7,21) 2) Ultrasonic Extraction, Gas Chromatographic Method ^(8,21)

20 Lead...

ลำดับ	สารมลพิษ	วิธีวิเคราะห์
5	Beryllium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,4,12) 2) Digestion, Inductively Coupled Plasma Method ^(5,12)
6	Cadmium	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^(1,4,13) 2) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,4,12) 3) Digestion, Flame Atomic Absorption Spectrometric Method ^(5,13) 4) Digestion, Inductively Coupled Plasma Method ^(5,12)
7	Chlordane	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^(1,7,21) 2) Ultrasonic Extraction, Gas Chromatographic Method ^(8,21)
8	Chromium	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^(1,4,13) 2) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,4,12) 3) Digestion, Flame Atomic Absorption Spectrometric Method ^(5,13) 4) Digestion, Inductively Coupled Plasma Method ^(5,12)
9	Chromium (II)	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method; Waste Extraction, Colorimetric Method; Calculation ^(1,4,13,15) 2) Waste Extraction, Digestion, Inductively Coupled Plasma Method; Waste Extraction, Colorimetric Method; Calculation ^(1,4,12,15) 3) Digestion, Flame Atomic Absorption Spectrometric Method; Alkaline Digestion, Colorimetric Method; Calculation ^(5,6,13,15) 4) Digestion, Inductively Coupled Plasma Method; Alkaline Digestion, Colorimetric Method; Calculation ^(5,6,13,15)
10	Chromium (VI)	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method; Alkaline Digestion, Colorimetric Method; Calculation ^(5,6,13,15) 2) Alkaline Digestion, Colorimetric Method; Calculation ^(5,6,13,15)
11	Cobalt	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,4,12) 2) Digestion, Inductively Coupled Plasma Method ^(5,12)

12 Copper...

ลำดับ	สารมลพิษ	วิธีวิเคราะห์
26	Polychlorinated Biphenyls - Aroclor 1016 - Aroclor 1221 - Aroclor 1232 - Aroclor 1242 - Aroclor 1248 - Aroclor 1254 - Aroclor 1260 - 2-Chlorobiphenyl - 2,3-Dichlorobiphenyl - 2,2',5'-Trichlorobiphenyl - 2,4',5'-Trichlorobiphenyl - 2,2',3,5'-Tetrachlorobiphenyl - 2,2',5,5'-Tetrachlorobiphenyl - 2,3',4,4'-Tetrachlorobiphenyl - 2,2',3,4,5'- Pentachlorobiphenyl - 2,2',4,5,5'- Pentachlorobiphenyl - 2,3,3',4',6- Pentachlorobiphenyl - 2,2',3,4,4',5'- Hexachlorobiphenyl - 2,2',3,4,5,5'- Hexachlorobiphenyl - 2,2',3,5,5',6- Hexachlorobiphenyl - 2,2',4,4',5,5'- Hexachlorobiphenyl - 2,2',3,3',4,4',5- Heptachlorobiphenyl - 2,2',3,4,4',5,5'- Heptachlorobiphenyl - 2,2',3,4,4',5',6- Heptachlorobiphenyl - 2,2',3,4',5,5',6- Heptachlorobiphenyl - 2,2',3,3',4,4',5,5',6- Nonachlorobiphenyl	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^(1,7,22) 2) Ultrasonic Extraction, Gas Chromatographic Method ^(8,22)



27 Pentachlorophenol...

ลำดับ	สารมลพิษ	วิธีวิเคราะห์
20	Lead	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^(1,4,13) 2) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,4,12) 3) Digestion, Flame Atomic Absorption Spectrometric Method ^(5,13) 4) Digestion, Inductively Coupled Plasma Method ^(5,12) 1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^(1,7,21) 2) Ultrasonic Extraction, Gas Chromatographic Method ^(8,21)
21	Lindane	1) Waste Extraction, Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ^(1,16) 2) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,4,12)
22	Mercury	3) Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ⁽¹⁷⁾ 4) Digestion, Inductively Coupled Plasma Method ^(5,12) 5) Thermal Decomposition Amalgamation and Atomic Absorption Spectrometric Method ⁽¹⁸⁾
23	Methoxychlor	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^(1,7,21) 2) Ultrasonic Extraction, Gas Chromatographic Method ^(8,21)
24	Molybdenum	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,4,12) 2) Digestion, Inductively Coupled Plasma Method ^(5,12)
25	Nickel	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^(1,4,13) 2) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,4,12) 3) Digestion, Flame Atomic Absorption Spectrometric Method ^(5,13) 4) Digestion, Inductively Coupled Plasma Method ^(5,12)



26 Polychlorinated Biphenyls...

ลำดับ	สารมลพิษ	วิธีวิเคราะห์
35	Zinc	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^(1,4,13) 2) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,4,12) 3) Digestion, Flame Atomic Absorption Spectrometric Method ^(5,13) 4) Digestion, Inductively Coupled Plasma Method ^(5,12)

เอกสารอ้างอิง

- กระทรวงอุตสาหกรรม. ประกาศกระทรวงอุตสาหกรรม, พ.ศ. 2566. เรื่อง การจัดการสิ่งปฏิกูลหรือวัสดุที่ไม่ได้จัดว่าขยะมูลฝอย. 31 พฤษภาคม 2566. เล่มที่ 140 ตอนพิเศษ 126 จ.
- สมาคมวิศวกรรมสิ่งแวดล้อมแห่งประเทศไทย. คู่มือวิเคราะห์น้ำเสีย. พิมพ์ครั้งที่ 4. กรุงเทพฯ: เรือนแก้วการพิมพ์, 2547.
- APHA, AWWA, WEF. **Standard Methods for the Examination of Water and Wastewater**. 24th ed. Washington, DC: APHA, 2023.
- United States Environmental Protection Agency. **Test Methods for Evaluation Solid Waste Physical/Chemical Methods**. SW-846, 2014.
- United States Environmental Protection Agency. **Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Acid Digestion of Sediments, Sludges, and Soils**. SW-846 Method 3050B, 1996.
- United States Environmental Protection Agency. **Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Alkaline Digestion for Hexavalent Chromium**. SW-846 Method 3060A, 1996.
- United States Environmental Protection Agency. **Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Separatory Funnel Liquid-Liquid Extraction**. SW-846 Method 3510C, 1996.
- United States Environmental Protection Agency. **Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Ultrasonic Extraction**. SW-846 Method 3550C, 2007.
- United States Environmental Protection Agency. **Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Volatile Organic Compounds in Various Sample Matrices Using Equilibrium Headspace Analysis**. SW-846 Method 5021A, 2007.
- United States Environmental Protection Agency. **Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Purge and Trap for Aqueous Samples**. SW-846 Method 5030C, 2003.
- United States Environmental Protection Agency. **Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Closed System Purge and Trap and Extraction of Volatile Organics in Soil and Waste Sample**. SW-846 Method 5035A, 2003.
- United States...

ลำดับ	สารมลพิษ	วิธีวิเคราะห์
27	Pentachlorophenol	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1,7,24) 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(8,24) Electrometric Method ^(25,26)
28	pH	
29	Selenium	1) Waste Extraction, Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^(1,4,19) 2) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,4,12) 3) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^(5,19) 4) Digestion, Inductively Coupled Plasma Method ^(5,12)
30	Silver	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,4,12) 2) Digestion, Inductively Coupled Plasma Method ^(5,12)
31	Thallium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,4,12) 2) Digestion, Inductively Coupled Plasma Method ^(5,12)
32	Toxaphene	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^(1,7,21) 2) Ultrasonic Extraction, Gas Chromatographic Method ^(8,21)
33	Trichloroethylene	1) Waste Extraction, Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(1,10,23) 2) Waste Extraction, Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method ^(1,9,23) 3) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(1,1,23) 4) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method ^(9,23)
34	Vanadium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,4,21) 2) Digestion, Inductively Coupled Plasma Method ^(5,12)

25. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. **pH Electrometric Measurement. SW-846 Method 9040C, 2004.**
26. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. **Soil and Waste pH. SW-846 Method 9045D, 2004.**

31/10/2564

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12. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. **Inductively Coupled Plasma-Optical Emission Spectrometry. SW-846 Method 6010D, 2014.**
13. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. **Flame Atomic Absorption Spectrophotometry. SW-846 Method 7000B, 2007.**
14. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. **Arsenic (Atomic Absorption, Gaseous Hydride). SW-846 Method 7061A, 1992.**
15. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. **Chromium, Hexavalent (Colorimetric). SW-846 Method 7196A, 1992.**
16. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. **Mercury in Liquid Waste (Manual Cold Vapor Technique). SW-846 Method 7470A, 1994.**
17. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. **Mercury in Solid or Semisolid Waste (Manual Cold-Vapor Technique). SW-846 Method 7471B, 1998.**
18. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. **Mercury in Solids and Solutions by Thermal Decomposition, Amalgamation, and Atomic Absorption Spectrophotometry. SW-846 Method 7473, 2007.**
19. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. **Selenium (Atomic Absorption, Borohydride Reduction). SW-846 Method 7742, 1994.**
20. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. **Nonhalogenated Organics Using GC/FID. SW-846 Method 8015D, 2003.**
21. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. **Organochlorine Pesticides by Gas Chromatography. SW-846 Method 8081B, 2007.**
22. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. **Polychlorinated Biphenyls (PCBs) by Gas Chromatography. SW-846 Method 8082A, 2007.**
23. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. **Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry. SW-846 Method 8260D, 2018.**
24. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. **Semivolatile Organic Compounds by Gas Chromatography/Mass Spectrometry. SW-846 Method 8270E, 2018.**



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๑๕๕๑ ๒๕๕๑

เรื่อง เปลี่ยนแปลงบุคลากรของห้องปฏิบัติการวิเคราะห์
เรียน กรรมการผู้จัดการ บริษัท ยูนิเต็ด แอมนะลิสต์ แอนด์ เอ็นจิเนียริ่ง คอนซัลแตนท์ จำกัด

ตามหนังสืออ้างอิง บริษัท ยูนิเซฟ แอมบาสเดอร์ แอนด์ เอ็นจิเนียริ่ง คองซัลแตนท์ จำกัด ห้างปฏิบัติการโครงการที่เออาน ลพบุรีเมื่อ ๖-๑๕ สิงหาคมที่เลขที่ ๓๓ ถนนสุขุมวิท แขวงบางจาก เขตพระโขนง กรุงเทพมหานคร ขอเปลี่ยนแปลงโครงการขอให้อุปการกิจโครงการที่ ความสละยั้งแล้ว นับ

๑. ให้ยกเลิกเจ้าหน้าที่ประจำห้องปฏิบัติการที่ จำนวน ๕ ราย

- อนึ่ง หนังสือฉบับนี้จะมีขึ้นพร้อมหนังสือสำหรับต้นเหตุเป็นหนังสือปฏิวัติการวิเคราะห์ เอกชน คือในวันที่ ๒ กุมภาพันธ์ ๒๕๖๕ ทั้งนี้ สามารถยื่นคำขอผ่านระบบอิเล็กทรอนิกส์ได้ทั้งหน้าเว็บไซต์ กรมโรงงานอุตสาหกรรม

ขอแสดงความนับถือ

ผู้ชำนาญการพิเศษ
ปฏิบัติราชการพิเศษ
CONSULTANT COMPANY LIMITED

Green Industry
SUSTAINABLE BUSINESS

“อุตสาหกรรมทั่วโลก ประเทศไทยก้าวหน้า ร่วมกันพัฒนา อุตสาหกรรมสีเขียว”



กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท
เขตราชเทวี กรุงเทพฯ ๑๐๔๐๐

๑๓ ธันวาคม ๒๕๖๖

เรียน กรรมการผู้จัดการ บริษัท ^{ยู}เอ็นดี แอนนาลิสต์ แอนด์ เอ็นจิเนียริง คอนซัลแตนท์ จำกัด

ตามหนังสือที่อ้างถึง บริษัท ยูนิเต็ด แอมบาสส์ เอนด์ เอ็นจิเนียริง คอมเพลคแทนท์ จำกัด
 ขอปฏิบัติบริการวิศวกรรม เลขทะเบียน ๖-๑๔๔ สถานีตั้งแต่ที่ ๓ รอยอุบลสุข ๔๑ ถนนสุขุมวิท
 แขวงบางจาก เขตพระโขนง กรุงเทพมหานคร ขอเปลี่ยนแปลงบุคลากรของห้องปฏิบัติการวิเคราะห์
 ความละเอียดแล้ว นั้น

จำนวน ๖ ราย ได้แก่

- องค์ พันสีถนัดจะหมดอายุพร้อมหนังสือต่ออายุรั้งหนึ่งเพียบพร้อมทั้งพิธีการขึ้นทะเบียน
 เอกชน คือในวันที่ ๒ กุมภาพันธ์ ๒๕๖๕ ทั้งนี้ สามารถยื่นคำขอผ่านระบบอิเล็กทรอนิกส์ได้ทั้งเว็บไซต์
 กรมโรงงานอุตสาหกรรม

ขอแสดงความนับถือ

ผู้ชำนาญการพิเศษ
บริษัท วิศวกรที่ปรึกษา
และสถาปนิก (มหาชน)
UNITED ANALYST AND ENGINEERING
CONSULTANT COMPANY LIMITED

Green Industry
sustainable



- ๒ -

อนึ่ง หนังสือฉบับนี้จะหมดอายุพร้อมหนังสือออกยืนยันทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน
ที่ อก ๐๓๑๐(๑)/๑๘๘๙ ลงวันที่ ๙ กุมภาพันธ์ ๒๕๖๕ คือในวันที่ ๒ กุมภาพันธ์ ๒๕๖๘ ทั้งนี้ สามารถยื่นคำขอ
ผ่านระบบอิเล็กทรอนิกส์ได้ทันทีผ่านเว็บไซต์กรมโรงงานอุตสาหกรรม ตาม QR Code หายหนังสือฉบับนี้

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ



ผู้อำนวยการกองวิจัยและพัฒนายุทธศาสตร์โรงงาน
ปฏิบัติการกรมโรงงานอุตสาหกรรม



ยื่นคำขอผ่านระบบอิเล็กทรอนิกส์



ที่ อก ๐๓๑๐(๑)/ ๒ ๐ ๘

กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท
เขตราชเทวี กรุงเทพฯ ๑๐๕๐๐

๒ ๒ มีนาคม ๒๕๖๖

เรื่อง เปลี่ยนแปลงบุคลากรและสามารถพิมพ์ที่วิเคราะห์

เรียน กรรมการผู้จัดการ บริษัท ยูไนเต็ด แอนาไลส์ แอนด์ เอ็นจิเนียริง คอนซัลแตนท์ จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และขอปิดสามารถพิมพ์ห้องปฏิบัติการวิเคราะห์เอกชน
ลงวันที่ ๓๐ มกราคม ๒๕๖๖

สิ่งที่ส่งมาด้วย เอกสารแนบท้ายหนังสือเปลี่ยนแปลงบุคลากรและสามารถพิมพ์ที่วิเคราะห์

บริษัท ยูไนเต็ด แอนาไลส์ แอนด์ เอ็นจิเนียริง คอนซัลแตนท์ จำกัด จำนวน ๒ แผ่น

ตามหนังสือที่อ้างถึง บริษัท ยูไนเต็ด แอนาไลส์ แอนด์ เอ็นจิเนียริง คอนซัลแตนท์ จำกัด ขอขออนุมัติ
ห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ๖-๑๕๕ สถานที่ตั้งเลขที่ ๓ ซอยอุดมสุข ๔๑ ถนนสุขุมวิท
แขวงบางจาก เขตพระโขนง กรุงเทพมหานคร ขอเปลี่ยนแปลงบุคลากรและสามารถพิมพ์ที่วิเคราะห์
ความละเอียดแล้ว นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว มีความเห็นดังนี้

๑. ให้ยกเลิกเจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๒ ราย

๑ ทะเบียนเลขที่ ๖-๑๕๕-จ-๐๐๑๖

๒ ทะเบียนเลขที่ ๖-๑๕๕-จ-๐๐๕๗

๒. ให้เพิ่มเจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๑๑ ราย

๑ ทะเบียนเลขที่ ๖-๑๕๕-จ-๐๑๑๒

๒ ทะเบียนเลขที่ ๖-๑๕๕-จ-๐๑๓๓

๓ ทะเบียนเลขที่ ๖-๑๕๕-จ-๐๑๓๔

๔ ทะเบียนเลขที่ ๖-๑๕๕-จ-๐๑๓๕

๕ ทะเบียนเลขที่ ๖-๑๕๕-จ-๐๑๓๖

๖ ทะเบียนเลขที่ ๖-๑๕๕-จ-๐๑๓๗

๗ ทะเบียนเลขที่ ๖-๑๕๕-จ-๐๑๓๘

๘ ทะเบียนเลขที่ ๖-๑๕๕-จ-๐๑๓๙

๙ ทะเบียนเลขที่ ๖-๑๕๕-จ-๐๑๔๐

๑๐ ทะเบียนเลขที่ ๖-๑๕๕-จ-๐๑๔๑

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๓. ให้เพิ่มข้อมูลข่าวสารสามารถพิมพ์ที่วิเคราะห์ในด้านอื่นที่ส่งมา

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“อุตสาหกรรมก้าวหน้า ร่วมกันพัฒนา อุตสาหกรรมสีเขียว”



อนึ่ง...

เอกสารอ้างอิง

1. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Volatile Organic Compounds in Various Sample Matrices Using Equilibrium Headspace Analysis. SW-846 Method 5021A, 2014.
2. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry. SW-846 Method 8260D, 2018.

เอกสารแนบท้ายหนังสือเปลี่ยนแปลงบุคลากรและสารเคมีที่วิเคราะห์
บริษัท ยูนิเทค แอนาไลติกส์ แอนด์ เอ็นจิเนียริง คอนซัลแตนท์ จำกัด เลขทะเบียน ๖-๑๔๕
ที่ อก ๐๓๐(๑)/ ๖ ๐ ๒ ๘ ลงวันที่ ๒๒ มีนาคม ๒๕๖๖

ขอแนบสารเคมีที่ได้รับขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๑๖ รายการ

ดิน จำนวน 16 รายการ

ลำดับที่	สารเคมี	วิธีวิเคราะห์
1	Benzene	Equilibrium Headspace, Gas Chromatographic/ Mass Spectrometric Method ^(1,2)
2	Carbon tetrachloride	Equilibrium Headspace, Gas Chromatographic/ Mass Spectrometric Method ^(1,2)
3	1,2-Dichloroethane	Equilibrium Headspace, Gas Chromatographic/ Mass Spectrometric Method ^(1,2)
4	1,1-Dichloroethylene	Equilibrium Headspace, Gas Chromatographic/ Mass Spectrometric Method ^(1,2)
5	cis-1,2-Dichloroethylene	Equilibrium Headspace, Gas Chromatographic/ Mass Spectrometric Method ^(1,2)
6	trans-1,2-Dichloroethylene	Equilibrium Headspace, Gas Chromatographic/ Mass Spectrometric Method ^(1,2)
7	Ethylbenzene	Equilibrium Headspace, Gas Chromatographic/ Mass Spectrometric Method ^(1,2)
8	Methylene chloride	Equilibrium Headspace, Gas Chromatographic/ Mass Spectrometric Method ^(1,2)
9	Styrene	Equilibrium Headspace, Gas Chromatographic/ Mass Spectrometric Method ^(1,2)
10	Tetrachloroethylene	Equilibrium Headspace, Gas Chromatographic/ Mass Spectrometric Method ^(1,2)
11	Toluene	Equilibrium Headspace, Gas Chromatographic/ Mass Spectrometric Method ^(1,2)
12	Trichloroethylene	Equilibrium Headspace, Gas Chromatographic/ Mass Spectrometric Method ^(1,2)
13	m-Xylene	Equilibrium Headspace, Gas Chromatographic/ Mass Spectrometric Method ^(1,2)
14	o-Xylene	Equilibrium Headspace, Gas Chromatographic/ Mass Spectrometric Method ^(1,2)
15	p-Xylene	Equilibrium Headspace, Gas Chromatographic/ Mass Spectrometric Method ^(1,2)
16	Xylene (Total)	Equilibrium Headspace, Gas Chromatographic/ Mass Spectrometric Method ^(1,2)

อนึ่ง หนังสือฉบับนี้จะหมดอายุพร้อมหนังสือตอบรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน
ที่ อก ๐๓๑๐(๑)/๑๘๘๙ ลงวันที่ ๙ กุมภาพันธ์ ๒๕๖๕ คือในวันที่ ๒ กุมภาพันธ์ ๒๕๖๘ ทั้งนี้ สามารถยื่นคำขอ
ผ่านระบบอิเล็กทรอนิกส์ได้ทั้งนี้โปรดกรมนำใบรับใช้กรมโรงงานอุตสาหกรรม ตาม QR Code ห้ายหนังสือฉบับนี้

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ



ผู้อำนวยการกองวิจัยและเชื่อมกับแลพิซโรงงาน
ปฏิบัติการทางเทคโนอิติมโรงงานอุตสาหกรรม



ยื่นคำขอผ่านระบบอิเล็กทรอนิกส์

กองวิจัยและเชื่อมกับแลพิซโรงงาน

กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบแลพิซและทะเบียนห้องปฏิบัติการ

โทร. ๐ ๒๕๓๐ ๖๓๑๒ ถึง ๒๑๐๓-๕

โทรสาร ๐ ๒๕๓๐ ๖๓๑๒ ถึง ๒๑๔๙

ไปรษณีย์อิเล็กทรอนิกส์ saraban@diw.mail.go.th



Green Industry “อุตสาหกรรมก้าวไกล ประเทศไทยก้าวหน้า ร่วมกันพัฒนา อุตสาหกรรมสีเขียว”



ที่ อก ๐๓๑๐(๑)/ ๑ ๕ ๕ ๕ ๕ ๓

กรมโรงงานอุตสาหกรรม

ถนนพระรามที่ ๒ แขวงทุ่งพญาไท

เขตราชเทวี กรุงเทพฯ ๑๐๔๐๐

๒ ๕ ตุลาคม ๒๕๖๕

เรื่อง เปลี่ยนแปลงบุคลากรของห้องปฏิบัติการวิเคราะห์

เรียน กรรมการผู้จัดการ บริษัท ยูไนเต็ด แอนนาลิสต์ แอนด์ เอ็นจิเนียริง คอนสัลแตนท์ จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารเคมีของห้องปฏิบัติการวิเคราะห์เอกชน
ลงวันที่ ๑๘ ตุลาคม ๒๕๖๕

ตามหนังสือที่อ้างถึง บริษัท ยูไนเต็ด แอนนาลิสต์ แอนด์ เอ็นจิเนียริง คอนสัลแตนท์ จำกัด
ห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ว-๑๔๔๕ สถานที่ตั้งเลขที่ ๓ ซอยอุดมสุข ๔๑ ถนนสุขุมวิท แขวงก่งจาก
เขตพระโขนง กรุงเทพมหานคร ขอเปลี่ยนแปลงบุคลากรของห้องปฏิบัติการวิเคราะห์ ความละเอียดแล้ว นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว มีความเห็นดังนี้

๑. ใหยกเลิกเจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๔ ราย

๑) ทะเบียนเลขที่ ว-๑๔๔๕-จ-๐๐๐๒๒

๒) ทะเบียนเลขที่ ว-๑๔๔๕-จ-๐๐๒๔

๓) ทะเบียนเลขที่ ว-๑๔๔๕-จ-๐๐๔๕

๔) ทะเบียนเลขที่ ว-๑๔๔๕-จ-๐๐๐๗

๒. ให้เพิ่มผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์ จำนวน ๒ ราย

๑) ทะเบียนเลขที่ ว-๑๔๔๕-ค-๐๐๔๑

๒) ทะเบียนเลขที่ ว-๑๔๔๕-ค-๐๐๔๒

๓. ให้เพิ่มเจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๑๒ ราย

๑) ทะเบียนเลขที่ ว-๑๔๔๕-จ-๐๐๒๐

๒) ทะเบียนเลขที่ ว-๑๔๔๕-จ-๐๐๒๑

๓) ทะเบียนเลขที่ ว-๑๔๔๕-จ-๐๐๒๒

๔) ทะเบียนเลขที่ ว-๑๔๔๕-จ-๐๐๒๓

๕) ทะเบียนเลขที่ ว-๑๔๔๕-จ-๐๐๒๔

๖) ทะเบียนเลขที่ ว-๑๔๔๕-จ-๐๐๒๕

๗) ทะเบียนเลขที่ ว-๑๔๔๕-จ-๐๐๒๖

๘) ทะเบียนเลขที่ ว-๑๔๔๕-จ-๐๐๒๗

๙) ทะเบียนเลขที่ ว-๑๔๔๕-จ-๐๐๒๘

๑๐) ทะเบียนเลขที่ ว-๑๔๔๕-จ-๐๐๒๙

๑๑) ทะเบียนเลขที่ ว-๑๔๔๕-จ-๐๐๓๐

๑๒) ทะเบียนเลขที่ ว-๑๔๔๕-จ-๐๐๓๑

อนึ่ง หนังสือฉบับนี้...



ที่ อก ๐๓๑๐(๑)/ ๑๘๗ ๙

กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท
เขตราชเทวี กรุงเทพฯ ๑๐๔๐๐

๐ ๙ กุมภาพันธ์ ๒๕๖๕

เรื่อง คัดค้านข้อเสนอสื่อรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

เรียน กรรมการผู้จัดการ บริษัท ยูไนเต็ด แอนนาลิสต์ แอนด์ เอ็นจิเนียริ่ง คอนซัลแตนท์ จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารเคมีของห้องปฏิบัติการวิเคราะห์เอกชน
ลงวันที่ ๒๗ ธันวาคม ๒๕๖๔

สิ่งที่ส่งมาด้วย ๑. รายชื่อผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์ จำนวน ๔๐ ราย
๒. รายชื่อเจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๑๐๖ ราย
๓. ขอบข่ายสารเคมีที่ได้รับขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม

ตามหนังสือที่อ้างถึง บริษัท ยูไนเต็ด แอนนาลิสต์ แอนด์ เอ็นจิเนียริ่ง คอนซัลแตนท์ จำกัด ขอต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ๖-๑๔๕ สถานที่ตั้งเลขที่ ๓ ซอยอุดมสุข ๔๑ ถนนสุขุมวิท แขวงบางนา เขตพระโขนง กรุงเทพมหานคร ต่อกรมโรงงานอุตสาหกรรม นั้น กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้บริษัท ยูไนเต็ด แอนนาลิสต์ แอนด์ เอ็นจิเนียริ่ง คอนซัลแตนท์ จำกัด ต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน โดยมีองค์ประกอบดังนี้

ก. ผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์ จำนวน ๔๐ ราย ตามสิ่งที่ส่งมาด้วย ๑

ข. เจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๑๐๖ ราย ตามสิ่งที่ส่งมาด้วย ๒

ค. ขอบข่ายสารเคมีที่ได้รับขึ้นทะเบียนไว้วิเคราะห์ในน้ำเสีย น้ำใต้ดิน อากาศเสีย สิ่งปฏิกูล หรือวัสดุที่ไม่ใช้แล้ว และดิน ตามสิ่งที่ส่งมาด้วย ๓

หนังสือฉบับนี้จะหมดอายุในวันที่ ๒ กุมภาพันธ์ ๒๕๖๘ หากประสงค์จะต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน ให้ยื่นคำขอต่ออายุพร้อมเอกสารประกอบคำขอต่อกรมโรงงานอุตสาหกรรมภายใน ๓๐ วัน ก่อนวันสิ้นสุดของหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน ทั้งนี้ สามารถยื่นคำขอผ่านระบบอิเล็กทรอนิกส์ได้ทั้งนี้เว็บไซต์กรมโรงงานอุตสาหกรรม ตาม QR Code หายหนังสือฉบับนี้

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ



ผู้อำนวยการสำนักงานคณะกรรมการ
ผู้ปฏิบัติราชการแทนอธิบดีกรมโรงงานอุตสาหกรรม

กรมโรงงานอุตสาหกรรม

UNIFIED ANALYST AND ENGINEERING
CONSULTANT COMPANY LIMITED

กองวิจัยและเตือนภัยมลพิษโรงงาน

กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบแลพิทซ์และทะเบียนห้องปฏิบัติการ

โทร. ๐ ๒๕๓๐ ๖๓๑๒ ต่อ ๒๑๐๓-๕

โทรสาร ๐ ๒๕๓๐ ๖๓๑๒ ต่อ ๒๑๔๔

ไปรษณีย์อิเล็กทรอนิกส์ saraban@dw.mail.go.th



ที่ อก ๐๓๑๐(๑)/ ๔๗๘ ๗

กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท
เขตราชเทวี กรุงเทพฯ ๑๐๔๐๐

๒๑ เมษายน ๒๕๖๕

เรื่อง เปลี่ยนแปลงบุคลากรของห้องปฏิบัติการวิเคราะห์

เรียน กรรมการผู้จัดการ บริษัท ยูไนเต็ด แอนนาลิสต์ แอนด์ เอ็นจิเนียริ่ง คอนซัลแตนท์ จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารเคมีของห้องปฏิบัติการวิเคราะห์เอกชน
ลงวันที่ ๓๐ มีนาคม ๒๕๖๔

ตามหนังสือที่อ้างถึง บริษัท ยูไนเต็ด แอนนาลิสต์ แอนด์ เอ็นจิเนียริ่ง คอนซัลแตนท์ จำกัด ขอต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ๖-๑๔๕ สถานที่ตั้งเลขที่ ๓ ซอยอุดมสุข ถนนสุขุมวิท แขวงบางนา เขตพระโขนง กรุงเทพมหานคร ขอเปลี่ยนแปลงบุคลากรของห้องปฏิบัติการวิเคราะห์ ความละเอียดแล้ว นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว มีความเห็นดังนี้

๑. ให้ยกเลิกผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์ จำนวน ๒ ราย
ทะเบียนเลขที่ ๖-๑๔๕-๖-๐๐๐๔
๒. ให้ยกเลิกเจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๒ ราย
ทะเบียนเลขที่ ๖-๑๔๕-๖-๐๐๓๒
๑. ผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์ จำนวน ๔๐ ราย ตามสิ่งที่ส่งมาด้วย ๑
๒. เจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๒ ราย
ทะเบียนเลขที่ ๖-๑๔๕-๖-๐๐๖๔
๓. ให้เพิ่มเจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๒ ราย
ทะเบียนเลขที่ ๖-๑๔๕-๖-๐๐๘๔
๑. ขอบข่ายสารเคมีที่ได้รับขึ้นทะเบียนไว้วิเคราะห์ในน้ำเสีย น้ำใต้ดิน อากาศเสีย สิ่งปฏิกูล หรือวัสดุที่ไม่ใช้แล้ว และดิน ตามสิ่งที่ส่งมาด้วย ๓
๒. ขอบข่ายสารเคมีที่ได้รับขึ้นทะเบียนไว้วิเคราะห์ในน้ำเสีย น้ำใต้ดิน อากาศเสีย สิ่งปฏิกูล หรือวัสดุที่ไม่ใช้แล้ว และดิน ตามสิ่งที่ส่งมาด้วย ๓

อนึ่ง หนังสือฉบับนี้จะหมดอายุพร้อมหนังสือขอรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน ที่ อก ๐๓๑๐(๑)/๑๘๗๘ ลงวันที่ ๔ กุมภาพันธ์ ๒๕๖๕ คือในวันที่ ๒ กุมภาพันธ์ ๒๕๖๘ ทั้งนี้ สามารถยื่นคำขอผ่านระบบอิเล็กทรอนิกส์ได้ทั้งนี้เว็บไซต์กรมโรงงานอุตสาหกรรม ตาม QR Code หายหนังสือฉบับนี้

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ



ผู้อำนวยการสำนักงานคณะกรรมการ
ผู้ปฏิบัติราชการแทนอธิบดีกรมโรงงานอุตสาหกรรม

กรมโรงงานอุตสาหกรรม

กองวิจัยและเตือนภัยมลพิษโรงงาน

กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบแลพิทซ์และทะเบียนห้องปฏิบัติการ

โทร. ๐ ๒๕๓๐ ๖๓๑๒ ต่อ ๒๑๐๓-๕

โทรสาร ๐ ๒๕๓๐ ๖๓๑๒ ต่อ ๒๑๔๔

ไปรษณีย์อิเล็กทรอนิกส์ saraban@dw.mail.go.th

Green Industry
Sustainable Development



“อุตสาหกรรมก้าวไกล ประเทศไทยก้าวหน้า ร่วมกันพัฒนา อุตสาหกรรมสีเขียว”

เอกสารแนบท้ายหนังสือรับต่ออายุขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน
บริษัท ยูนิเทค แอสมาลิสต์ แอนด์ เอ็นจิเนียริ่ง คอนซัลแตนท์ จำกัด เลขทะเบียน ว-๑๕๕
ที่ อภ ๐๓๑๐(๑)/ ๑๘๗/ ๕ ลงวันที่ ๐๙ กุมภาพันธ์ ๒๕๖๕

ก. ผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์ จำนวน ๔๐ ราย

๑)	[REDACTED]	ทะเบียนเลขที่ ว-๑๕๕-ค-๐๐๐๑
๒)	[REDACTED]	ทะเบียนเลขที่ ว-๑๕๕-ค-๐๐๐๒
๓)	[REDACTED]	ทะเบียนเลขที่ ว-๑๕๕-ค-๐๐๐๓
๔)	[REDACTED]	ทะเบียนเลขที่ ว-๑๕๕-ค-๐๐๐๔
๕)	[REDACTED]	ทะเบียนเลขที่ ว-๑๕๕-ค-๐๐๐๕
๖)	[REDACTED]	ทะเบียนเลขที่ ว-๑๕๕-ค-๐๐๐๖
๗)	[REDACTED]	ทะเบียนเลขที่ ว-๑๕๕-ค-๐๐๐๗
๘)	[REDACTED]	ทะเบียนเลขที่ ว-๑๕๕-ค-๐๐๐๘
๙)	[REDACTED]	ทะเบียนเลขที่ ว-๑๕๕-ค-๐๐๐๙
๑๐)	[REDACTED]	ทะเบียนเลขที่ ว-๑๕๕-ค-๐๐๑๐
๑๑)	[REDACTED]	ทะเบียนเลขที่ ว-๑๕๕-ค-๐๐๑๑
๑๒)	[REDACTED]	ทะเบียนเลขที่ ว-๑๕๕-ค-๐๐๑๒
๑๓)	[REDACTED]	ทะเบียนเลขที่ ว-๑๕๕-ค-๐๐๑๓
๑๔)	[REDACTED]	ทะเบียนเลขที่ ว-๑๕๕-ค-๐๐๑๔
๑๕)	[REDACTED]	ทะเบียนเลขที่ ว-๑๕๕-ค-๐๐๑๕
๑๖)	[REDACTED]	ทะเบียนเลขที่ ว-๑๕๕-ค-๐๐๑๖
๑๗)	[REDACTED]	ทะเบียนเลขที่ ว-๑๕๕-ค-๐๐๑๗
๑๘)	[REDACTED]	ทะเบียนเลขที่ ว-๑๕๕-ค-๐๐๑๘
๑๙)	[REDACTED]	ทะเบียนเลขที่ ว-๑๕๕-ค-๐๐๑๙
๒๐)	[REDACTED]	ทะเบียนเลขที่ ว-๑๕๕-ค-๐๐๒๐
๒๑)	[REDACTED]	ทะเบียนเลขที่ ว-๑๕๕-ค-๐๐๒๑
๒๒)	[REDACTED]	ทะเบียนเลขที่ ว-๑๕๕-ค-๐๐๒๒
๒๓)	[REDACTED]	ทะเบียนเลขที่ ว-๑๕๕-ค-๐๐๒๓
๒๔)	[REDACTED]	ทะเบียนเลขที่ ว-๑๕๕-ค-๐๐๒๔
๒๕)	[REDACTED]	ทะเบียนเลขที่ ว-๑๕๕-ค-๐๐๒๕
๒๖)	[REDACTED]	ทะเบียนเลขที่ ว-๑๕๕-ค-๐๐๒๖
๒๗)	[REDACTED]	ทะเบียนเลขที่ ว-๑๕๕-ค-๐๐๒๗
๒๘)	[REDACTED]	ทะเบียนเลขที่ ว-๑๕๕-ค-๐๐๒๘
๒๙)	[REDACTED]	ทะเบียนเลขที่ ว-๑๕๕-ค-๐๐๒๙
๓๐)	[REDACTED]	ทะเบียนเลขที่ ว-๑๕๕-ค-๐๐๓๐



๓๖) นายคุณัฐ...

ผู้ถือใบอนุญาตนี้: ผู้อำนวยการ

ทะเบียนเลขที่ ว-๑๕๕-ค-๐๐๓๖
ทะเบียนเลขที่ ว-๑๕๕-ค-๐๐๓๗
ทะเบียนเลขที่ ว-๑๕๕-ค-๐๐๓๘
ทะเบียนเลขที่ ว-๑๕๕-ค-๐๐๓๙
ทะเบียนเลขที่ ว-๑๕๕-ค-๐๐๔๐

[REDACTED]
ผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์เอกชน
บริษัท ยูนิเทค แอสมาลิสต์ แอนด์ เอ็นจิเนียริ่ง คอนซัลแตนท์ จำกัด



-๒-

๓๖	ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๐๓๖
๓๗	ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๐๓๗
๓๘	ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๐๓๘
๓๙	ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๐๓๙
๔๐	ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๐๔๐
๔๑	ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๐๔๑
๔๒	ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๐๔๒
๔๓	ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๐๔๓
๔๔	ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๐๔๔
๔๕	ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๐๔๕
๔๖	ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๐๔๖
๔๗	ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๐๔๗
๔๘	ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๐๔๘
๔๙	ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๐๔๙
๕๐	ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๐๕๐
๕๑	ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๐๕๑
๕๒	ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๐๕๒
๕๓	ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๐๕๓
๕๔	ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๐๕๔
๕๕	ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๐๕๕
๕๖	ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๐๕๖
๕๗	ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๐๕๗
๕๘	ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๐๕๘
๕๙	ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๐๕๙
๖๐	ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๐๖๐
๖๑	ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๐๖๑
๖๒	ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๐๖๒
๖๓	ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๐๖๓
๖๔	ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๐๖๔
๖๕	ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๐๖๕
๖๖	ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๐๖๖
๖๗	ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๐๖๗
๖๘	ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๐๖๘
๖๙	ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๐๖๙
๗๐	ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๐๗๐
๗๑	ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๐๗๑
๗๒	ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๐๗๒



๗๓) นายอิทธิพงษ์...

ผู้ให้คำปรึกษาทางเทคนิค
บริษัท ปรึกษาทางเทคนิค จำกัด (มหาชน)

เอกสารแนบท้ายหนังสือรับต่ออายุขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน
บริษัท ยูนิเทค แอมนานาไลส์ แอนด์ เอ็นจิเนียริง คอนซัลแตนท์ จำกัด เลขทะเบียน ๖-๑๔๕
ที่ อก ๐๓๑๐(๑)/ ๑๘๗ ๙ ลงวันที่ ๑๙ กุมภาพันธ์ ๒๕๖๕

ข. เจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๑๐๖ ราย

๑)	ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๐๑๑
๒)	ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๐๑๒
๓)	ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๐๑๓
๔)	ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๐๑๔
๕)	ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๐๑๕
๖)	ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๐๑๖
๗)	ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๐๑๗
๘)	ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๐๑๘
๙)	ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๐๑๙
๑๐)	ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๐๒๐
๑๑)	ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๐๒๑
๑๒)	ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๐๒๒
๑๓)	ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๐๒๓
๑๔)	ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๐๒๔
๑๕)	ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๐๒๕
๑๖)	ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๐๒๖
๑๗)	ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๐๒๗
๑๘)	ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๐๒๘
๑๙)	ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๐๒๙
๒๐)	ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๐๓๐
๒๑)	ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๐๓๑
๒๒)	ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๐๓๒
๒๓)	ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๐๓๓
๒๔)	ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๐๓๔
๒๕)	ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๐๓๕
๒๖)	ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๐๓๖
๒๗)	ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๐๓๗
๒๘)	ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๐๓๘
๒๙)	ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๐๓๙
๓๐)	ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๐๔๐
๓๑)	ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๐๔๑
๓๒)	ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๐๔๒



๓๖) นายณภสินธุ์...

ผู้ให้คำปรึกษาทางเทคนิค
บริษัท ปรึกษาทางเทคนิค จำกัด (มหาชน)

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

น้ำใต้ดิน จำนวน 126 รายการ

ลำดับ	สารมลพิษ	วิธีวิเคราะห์
1	Acenaphthene	1) Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾ 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
2	Acetone	Purge and Trap Gas Chromatographic Method ⁽⁴⁾ Spectrometric Method ⁽⁴⁾
3	Aldrin	1) Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾ 2) Liquid-Liquid Extraction, Mass Spectrometric Method ⁽⁴⁾

ลำดับ	สารมลพิษ	วิธีวิเคราะห์
16	o,p'-DDT	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
17	4,4'-DDD	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
18	4,4'-DDE	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
19	4,4'-DDT	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
20	Dieldrin	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
21	Endosulfan I	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
22	Endosulfan II	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
23	Endosulfan sulfate	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
24	Endrin	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
25	Endrin aldehyde	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
26	Formaldehyde	Distillation, Colorimetric Method ⁽³⁾
27	Free Chlorine	1) Iodometric Method ⁽⁴⁾ 2) DPD Ferrous Titrimetric Method ⁽⁴⁾
28	Heptachlor	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
29	Heptachlor Epoxide	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
30	Hexavalent Chromium	1) Colorimetric Method ⁽⁴⁾ 2) Extraction, Direct Air-Acetylene Flame Method ⁽⁴⁾
31	Lead	1) Digestion, Direct Air-Acetylene Flame Method ⁽⁴⁾ 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method ⁽⁴⁾ 3) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾
32	Manganese	1) Digestion, Direct Air-Acetylene Flame Method ⁽⁴⁾ 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method ⁽⁴⁾ 3) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾
33	Mercury	Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ⁽⁴⁾
34	Methoxychlor	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
35	Nickel	1) Digestion, Direct Air-Acetylene Flame Method ⁽⁴⁾ 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method ⁽⁴⁾ 3) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾

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ลำดับ	สารมลพิษ	วิธีวิเคราะห์
15	Benzo(g,h,i)perylene	1) Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾ 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾ Digestion, Inductively Coupled Plasma Method ⁽⁴⁾
16	Beryllium	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
17	Bis(2-chloroethyl)ether	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
18	Bis(2-ethylhexyl)phthalate	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
19	Bromodichloromethane	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
20	Bromoform	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
21	Butanol	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
22	Butyl benzyl phthalate	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
23	Cadmium	1) Digestion, Direct Air-Acetylene Flame Method ⁽⁴⁾ 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method ⁽⁴⁾ 3) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾
24	Carbazole	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
25	Carbon disulfide	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
26	Carbon tetrachloride	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
27	Chlordane	1) Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾ 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
28	p-Chloroaniline	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
29	Chlorobenzene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾

30 Chlorodibromomethane...

15 Benzo(g,h,i)perylene...

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ลำดับ	สารมลพิษ	วิธีวิเคราะห์
4	Anthracene	1) Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾ 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾ Digestion, Inductively Coupled Plasma Method ⁽⁴⁾
5	Antimony	1) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾
6	Arsenic	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
7	Atrazine	1) Digestion, Electrothermal Atomic Absorption Spectrometric Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾
8	Barium	1) Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾ 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
9	Benz(a)anthracene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾ 1) Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾ 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
10	Benzene	1) Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾ 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
11	Benzo(b)fluoranthene	1) Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾ 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
12	Benzo(k)fluoranthene	1) Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾ 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
13	Benzoic acid	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
14	Benzo(a)pyrene	1) Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾ 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾

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ลำดับ	สารมลพิษ	วิธีวิเคราะห์
42	Dibenz(a,h)anthracene	1) Liquid-Liquid Extraction, Gas Chromatographic Method ^(a) 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(a)
43	Di-n-butyl phthalate	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(a)
44	1,2-Dichlorobenzene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ^(a)
45	1,3-Dichlorobenzene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ^(a)
46	1,4-Dichlorobenzene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ^(a)
47	3,3'-Dichlorobenzidine	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(a)
48	1,1-Dichloroethane	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ^(a)
49	1,2-Dichloroethane	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ^(a)
50	1,1-Dichloroethylene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ^(a)
51	cis-1,2-Dichloroethylene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ^(a)
52	trans-1,2-Dichloroethylene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ^(a)
53	2,4-Dichlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(a)
54	1,2-Dichloropropane	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ^(a)
55	1,3-Dichloropropane	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ^(a)
56	1,3-Dichloropropene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ^(a)
57	Dieldrin	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ^(a) 1) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(a) 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(a)

58 Diethyl phthalate...

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ลำดับ	สารมลพิษ	วิธีวิเคราะห์
30	Chlorodibromomethane	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ^(a)
31	Chloroform	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ^(a)
32	2-Chlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(a)
33	Chromium	1) Digestion, Direct Air-Acetylene Flame Method ^(a) 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method ^(a) 3) Digestion, Inductively Coupled Plasma Method ^(a)
34	Chromium (III)	1) Digestion, Direct Air-Acetylene Flame Method; Colorimetric Method; Calculation ^(a) 2) Digestion, Inductively Coupled Plasma Method; Colorimetric Method; Calculation ^(a)
35	Chromium (VI)	1) Colorimetric Method ^(a) 2) Extraction, Air-Acetylene Flame Method ^(a)
36	Chrysene	1) Liquid-Liquid Extraction, Gas Chromatographic Method ^(a) 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(a)
37	Cyanide	Distillation, Colorimetric Method ^(a)
38	2,4-D	Liquid-Liquid Extraction, Gas Chromatographic Method ^(a)
39	DDD	1) Liquid-Liquid Extraction, Gas Chromatographic Method ^(a) 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(a)
40	DDE	1) Liquid-Liquid Extraction, Gas Chromatographic Method ^(a) 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(a)
41	DDT	1) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(a) 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(a)

42 Dibenz(a,h)anthracene...

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ลำดับ	สารเคมี	วิธีวิเคราะห์
70	Heptachlor epoxide	1) Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾ 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
71	Hexachlorobenzene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
72	Hexachloro-1,3-butadiene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
73	n-Hexane	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
74	α-HCH	1) Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾ 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
75	β-HCH	1) Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾ 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
76	γ-HCH	1) Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾ 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
77	Hexachlorocyclopentadiene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
78	Hexachloroethane	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
79	Indeno(1,2,3-cd)pyrene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
80	Isophorone	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
81	Lead	1) Digestion, Direct Air-Acetylene Flame Method ⁽⁴⁾ 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method ⁽⁴⁾ 3) Digestion, Inductively Coupled Plasma Atomic Emission Spectrometric Method ⁽⁴⁾

82 Manganese...

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ลำดับ	สารเคมี	วิธีวิเคราะห์
58	Diethyl phthalate	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
59	2,4-Dimethylphenol	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
60	2,4-Dinitrophenol	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
61	2,4-Dinitrotoluene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
62	2,6-Dinitrotoluene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
63	Di-n-Octyl phthalate	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
64	Endosulfan	1) Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾ 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
65	Endrin	1) Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾ 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
66	Ethylbenzene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
67	Fluoranthene	1) Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾ 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
68	Fluorene	1) Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾ 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
69	Heptachlor	1) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾ 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾

70 Heptachlor epoxide...

ลำดับ	สารมลพิษ	วิธีวิเคราะห์
96	Polychlorinated Biphenyls - PCB 1016 - PCB 1221 - PCB 1232 - PCB-1242 - PCB-1248 - PCB-1254 - PCB-1260	1) Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾ 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
97	Pentachlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
98	pH	Electrometric Method ⁽⁴⁾
99	Phenanthrene	1) Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾ 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
100	Phenol	1) Distillation, Chloroform Extraction Method ⁽⁴⁾ 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
101	Pyrene	1) Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾ 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
102	Selenium	1) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾
103	Silver	Digestion, Inductively Coupled Plasma Method ⁽⁴⁾
104	Styrene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
105	1,1,2,2-Tetrachloroethane	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
106	Tetrachloroethylene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
107	Toluene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾

ลำดับ	สารมลพิษ	วิธีวิเคราะห์
82	Manganese	1) Digestion, Direct Air-Acetylene Flame Method ⁽⁴⁾ 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method ⁽⁴⁾
83	Mercury	3) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ⁽⁴⁾
84	Methanol	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
85	Methoxychlor	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
86	Methyl bromide	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
87	Methylene chloride	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
88	2-Methylphenol	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
89	2-Methylnaphthalene	1) Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾ 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
90	Methyl tert-butyl ether	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
91	Naphthalene	1) Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾ 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
92	Nickel	1) Digestion, Direct Air-Acetylene Flame Method ⁽⁴⁾ 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method ⁽⁴⁾
93	Nitrobenzene	3) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
94	N-Nitrosodiphenylamine	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
95	N-Nitrosodi-n-propylamine	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾

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ลำดับ	สารมลพิษ	วิธีวิเคราะห์
124	p-Xylene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
125	Xylene (Total)	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
126	Zinc	1) Digestion, Direct Air-Acetylene Flame Method ⁽⁴⁾ 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method ⁽⁴⁾ 3) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾

อวกาศเสีย (ปล่อยระบาย) จำนวน 25 รายการ

ลำดับ	สารมลพิษ	วิธีวิเคราะห์
1	Antimony	Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method ⁽⁵⁾
2	Arsenic	1) Isokinetic Sampling, Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ⁽⁵⁾ 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method ⁽⁵⁾
3	Cadmium	1) Isokinetic Sampling, Digestion, Direct Air-Acetylene Flame Method ⁽⁵⁾ 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method ⁽⁵⁾
4	Carbon Monoxide	Instrumental Analyzer Method ⁽⁵⁾
5	Chlorine	Isokinetic Sampling, Ion Chromatographic Method ⁽⁵⁾
6	Chromium	1) Isokinetic Sampling, Digestion, Direct Air-Acetylene Flame Method ⁽⁵⁾ 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method ⁽⁵⁾
7	Cobalt	Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method ⁽⁵⁾
8	Copper	1) Isokinetic Sampling, Digestion, Direct Air-Acetylene Flame Method ⁽⁵⁾ 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method ⁽⁵⁾
9	Cresol	Absorption Sampling, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾

10 Dioxins/Furans...

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ลำดับ	สารมลพิษ	วิธีวิเคราะห์
108	Toxaphene	1) Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾ 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
109	TPH (C ₅ - C ₆)	1) Purge and Trap, Gas Chromatographic Method ^(11,21) 2) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(11,25)
110	TPH (C ₈ - C ₁₆)	Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^(9,21)
111	TPH (C ₁₆ - C ₃₅)	Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^(9,21)
112	1,2,4-Trichlorobenzene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
113	1,1,1-Trichloroethane	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
114	1,1,2-Trichloroethane	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
115	Trichloroethylene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
116	2,4,5-Trichlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
117	2,4,6-Trichlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
118	1,3,5-Trimethylbenzene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
119	Vanadium	Digestion, Inductively Coupled Plasma Method ⁽⁴⁾
120	Vinyl acetate	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
121	Vinyl chloride	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
122	m-Xylene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
123	o-Xylene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾

124 p-Xylene...

สิ่งปฏิกูลหรือวัสดุที่ไม่ใช้แล้ว จำนวน 35 รายการ

ลำดับ	สารมลพิษ	วิธีการตรวจ
1	Aldrin	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^(2,9,22) 2) Ultrasonic Extraction, Gas Chromatographic Method ^(10,22)
2	Antimony	Digestion, Inductively Coupled Plasma Method ^(7,13)
3	Arsenic	1) Waste Extraction, Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^(2,6,15) 2) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(2,6,13)
4	Barium	3) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^(7,15) 4) Digestion, Inductively Coupled Plasma Method ^(7,13) 1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(2,6,13)
5	Beryllium	2) Digestion, Inductively Coupled Plasma Method ^(7,13) 1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(2,6,13)
6	Cadmium	2) Digestion, Inductively Coupled Plasma Method ^(7,13) 1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^(2,6,14) 2) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(2,6,13)
7	Chlordane	3) Digestion, Flame Atomic Absorption Spectrometric Method ^(7,14) 4) Digestion, Inductively Coupled Plasma Method ^(7,13) 1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^(2,9,22) 2) Ultrasonic Extraction, Gas Chromatographic Method ^(10,22)
8	Chromium	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^(2,6,13) 2) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(2,6,13)

3) Digestion,...

ลำดับ	สารมลพิษ	วิธีการตรวจ
10	Dioxins/Furans	Isokinetic Sampling ⁽⁵⁾
11	Hydrogen Chloride	Isokinetic Sampling, Ion Chromatographic Method ⁽⁵⁾
12	Hydrogen Fluoride	Isokinetic Sampling, Ion Chromatographic Method ⁽⁵⁾
13	Hydrogen Sulfide	Absorption Sampling, Iodometric Method ⁽⁵⁾
14	Lead	1) Isokinetic Sampling, Digestion, Direct Air-Acetylene Flame Method ⁽⁵⁾ 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method ⁽⁵⁾
15	Manganese	1) Isokinetic Sampling, Digestion, Direct Air-Acetylene Flame Method ⁽⁵⁾ 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method ⁽⁵⁾
16	Mercury	Isokinetic Sampling, Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ⁽⁵⁾
17	Nickel	1) Isokinetic Sampling, Digestion, Direct Air-Acetylene Flame Method ⁽⁵⁾ 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method ⁽⁵⁾
18	Opacity	Ringelmann's Method ⁽¹⁾
19	Oxides of Nitrogen	1) Absorption Sampling, Phenoldisulfonic acid Method ⁽⁵⁾ 2) Instrumental Analyzer Method ⁽⁵⁾
20	Selenium	1) Isokinetic Sampling, Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ⁽⁵⁾ 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method ⁽⁵⁾
21	Sulfur Dioxide	1) Absorption Sampling, Barium-Thorin Titrimetric Method ⁽⁵⁾ 2) Instrumental Analyzer Method ⁽⁵⁾
22	Sulfuric Acid	Isokinetic Sampling, Barium-Thorin Titrimetric Method ⁽⁵⁾
23	Total Suspended Particulate	Isokinetic Sampling, Gravimetric Method ⁽⁵⁾
24	Vanadium	Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method ⁽⁵⁾
25	Xylene	1) Isokinetic Sampling, Digestion, Direct Air-Acetylene Flame Method ⁽⁵⁾ 2) Adsorption Sampling, Gas Chromatographic Method ⁽⁵⁾

ลำดับ	สารเคมี	วิธีวิเคราะห์
15	DDE	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^(2,9,22) 2) Ultrasonic Extraction, Gas Chromatographic Method ^(10,22)
16	DDT	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^(2,9,22) 2) Ultrasonic Extraction, Gas Chromatographic Method ^(10,22)
17	Dieldrin	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^(2,9,22) 2) Ultrasonic Extraction, Gas Chromatographic Method ^(10,22)
18	Endrin	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^(2,9,22) 2) Ultrasonic Extraction, Gas Chromatographic Method ^(10,22)
19	Heptachlor	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^(2,9,22) 2) Ultrasonic Extraction, Gas Chromatographic Method ^(10,22)
20	Lead	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^(2,6,16) 2) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(2,6,13)
21	Lindane	3) Digestion, Flame Atomic Absorption Spectrometric Method ^(7,14) 4) Digestion, Inductively Coupled Plasma Method ^(7,13) 1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^(2,9,22) 2) Ultrasonic Extraction, Gas Chromatographic Method ^(10,22)
22	Mercury	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(2,6,13) 2) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(2,6,13)

ลำดับ	สารเคมี	วิธีวิเคราะห์
9	Chromium (III)	3) Digestion, Flame Atomic Absorption Spectrometric Method ^[7,14] 4) Digestion, Inductively Coupled Plasma Method ^[7,13] 1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method; Waste Extraction, Colorimetric Method; Calculation ^[2,6,14,16] 2) Waste Extraction, Digestion, Inductively Coupled Plasma Method; Waste Extraction, Colorimetric Method; Calculation ^[2,6,13,16] 3) Digestion, Flame Atomic Absorption Spectrometric Method; Alkaline Digestion, Colorimetric Method; Calculation ^[7,8,14,16] 4) Digestion, Inductively Coupled Plasma Method; Alkaline Digestion, Colorimetric Method; Calculation ^[7,8,13,16]
10	Chromium (VI)	1) Waste Extraction, Colorimetric Method ^[2,16] 2) Alkaline Digestion, Colorimetric Method ^[8,16]
11	Cobalt	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[2,6,13]
12	Copper	2) Digestion, Inductively Coupled Plasma Method ^[7,13] 1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^[2,6,14] 2) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[2,6,13]
13	2,4-D	3) Digestion, Flame Atomic Absorption Spectrometric Method ^[7,14] 4) Digestion, Inductively Coupled Plasma Method ^[7,13] 1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^[2,9,22] 2) Ultrasonic Extraction, Gas Chromatographic Method ^[10,22]
14	DDD	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^[2,9,22] 2) Ultrasonic Extraction, Gas Chromatographic Method ^[10,22]

ลำดับ	สารมลพิษ	วิธีวิเคราะห์
27	- 2,2',4,5,5'-Pentachlorobiphenyl - 2,3,3',4',6-Pentachlorobiphenyl - 2,2',3,4,4',5'-Hexachlorobiphenyl - 2,2',3,4,5,5'-Hexachlorobiphenyl - 2,2',3,5,5',6-Hexachlorobiphenyl - 2,2',4,4',5,5'-Hexachlorobiphenyl - 2,2',3,3',4,4',5-Heptachlorobiphenyl - 2,2',3,4,4',5,5'-Heptachlorobiphenyl - 2,2',3,4,4',5',6-Heptachlorobiphenyl - 2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl Pentachlorophenol	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(2,9,28) 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28) Electrometric Method ^(31,32) 1) Waste Extraction, Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^(2,9,20) 2) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(7,13) Plasma Method ^(2,6,13) 3) Digestion, Hydride Generation, Gas Chromatographic/Mass Spectrometric Method ^(2,6,13) 4) Digestion, Inductively Coupled Plasma Method ^(7,13)
28	pH	
29	Selenium	

ลำดับ	สารมลพิษ	วิธีวิเคราะห์
23	Methoxychlor	3) Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ⁽¹⁸⁾ 4) Digestion, Inductively Coupled Plasma Method ^(7,13) 5) Thermal Decomposition Amalgamation and Atomic Absorption Spectrometric Method ⁽¹⁹⁾ 1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^(2,9,22) 2) Ultrasonic Extraction, Gas Chromatographic Method ^(10,22)
24	Molybdenum	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(2,6,13) 2) Digestion, Inductively Coupled Plasma Method ^(7,13)
25	Nickel	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^(2,6,14) 2) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(2,6,13)
26	Polychlorinated Biphenyls - Aroclor 1016 - Aroclor 1221 - Aroclor 1232 - Aroclor 1242 - Aroclor 1248 - Aroclor 1254 - Aroclor 1260 - 2-Chlorobiphenyl - 2,3-Dichlorobiphenyl - 2,2',5-Trichlorobiphenyl - 2,4',5-Trichlorobiphenyl - 2,2',3,5'-Tetrachlorobiphenyl - 2,2',5,5'-Tetrachlorobiphenyl - 2,3',4,4'-Tetrachlorobiphenyl - 2,2',3,4,5'-Pentachlorobiphenyl	3) Digestion, Flame Atomic Absorption Spectrometric Method ^(7,14) 4) Digestion, Inductively Coupled Plasma Method ^(7,13) 1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^(2,9,23) 2) Ultrasonic Extraction, Gas Chromatographic Method ^(10,23) 

ลำดับ	สารมลพิษ	วิธีวิเคราะห์
3	Aldrin	1) Ultrasonic Extraction, Gas Chromatographic Method ^(10,22) 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26)
4	Anthracene	1) Ultrasonic Extraction, Gas Chromatographic Method ^(10,26) 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26)
5	Antimony	Digestion, Inductively Coupled Plasma Method ^(7,13)
6	Arsenic	1) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^(7,13) 2) Digestion, Inductively Coupled Plasma Method ^(7,13)
7	Atrazine	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26)
8	Barium	Digestion, Inductively Coupled Plasma Method ^(7,13)
9	Benzo(a)anthracene	1) Ultrasonic Extraction, Gas Chromatographic Method ^(10,24) 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26)
10	Benzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(12,25)
11	Benzo(b)fluoranthene	1) Ultrasonic Extraction, Gas Chromatographic Method ^(10,24) 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26)
12	Benzo(k)fluoranthene	1) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,24) 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26)
13	Benzoic acid	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26)
14	Benzo(a)pyrene	1) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,24) 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26)

15 Benzo(g,h,i)perylene...

ลำดับ	สารมลพิษ	วิธีวิเคราะห์
30	Silver	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(2,6,13) 2) Digestion, Inductively Coupled Plasma Method ^(7,13)
31	Thallium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(2,6,13) 2) Digestion, Inductively Coupled Plasma Method ^(7,13)
32	Toxaphene	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^(2,5,22) 2) Ultrasonic Extraction, Gas Chromatographic Method ^(10,22)
33	Trichloroethylene	1) Waste Extraction, Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(2,12,25) 2) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(12,25)
34	Vanadium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(2,6,13) 2) Digestion, Inductively Coupled Plasma Method ^(7,13)
35	Zinc	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^(2,6,14) 2) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(2,6,13) 3) Digestion, Flame Atomic Absorption Spectrometric Method ^(7,14) 4) Digestion, Inductively Coupled Plasma Method ^(7,13)

ดิน จำนวน 125 รายการ

ลำดับ	สารมลพิษ	วิธีวิเคราะห์
1	Acenaphthene	1) Ultrasonic Extraction, Gas Chromatographic Method ^(10,24) 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26)
2	Acetone	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26)

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ลำดับ	สารมลพิษ	วิธีวิเคราะห์
31	Chloroform	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(12,25)
32	2 Chlorophenol	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26)
33	Chromium	1) Digestion, Flame Atomic Absorption Spectrometric Method ^(7,14) 2) Digestion, Inductively Coupled Plasma Method ^(7,13)
34	Chromium (III)	1) Digestion, Flame Atomic Absorption Spectrometric Method; Alkaline Digestion, Colorimetric Method; Calculation ^(7,8,14,16) 2) Digestion, Inductively Coupled Plasma Method; Alkaline Digestion, Colorimetric Method; Calculation ^(7,8,13,16)
35	Chromium (VI)	Alkaline Digestion, Colorimetric Method ^(8,16)
36	Chrysene	1) Ultrasonic Extraction, Gas Chromatographic Method ^(10,24) 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26)
37	Cyanide	Extraction, Distillation, Colorimetric Method ^(28,29,30)
38	2,4-D	Ultrasonic Extraction, Gas Chromatographic Method ⁽²⁷⁾
39	DDD	1) Ultrasonic Extraction, Gas Chromatographic Method ^(10,22) 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26)
40	DDE	1) Ultrasonic Extraction, Gas Chromatographic Method ^(10,22) 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26)
41	DDT	1) Ultrasonic Extraction, Gas Chromatographic Method ^(10,22) 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26)
42	Dibenz(a,h)anthracene	1) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26) 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26)

43 Di-n-butyl phthalate...

ลำดับ	สารมลพิษ	วิธีวิเคราะห์
15	Benzo(g,h,i)perylene	1) Ultrasonic Extraction, Gas Chromatographic Method ^(10,22) 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26)
16	Beryllium	Digestion, Inductively Coupled Plasma Method ^(7,13)
17	Bis(2-chloroethyl)ether	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26)
18	Bis(2-ethylhexyl)phthalate	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26)
19	Bromodichloromethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(12,25)
20	Bromoform	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(12,25)
21	Butanol	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(12,25)
22	Butyl benzyl phthalate	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26)
23	Cadmium	1) Digestion, Flame Atomic Absorption Spectrometric Method ^(7,14) 2) Digestion, Inductively Coupled Plasma Method ^(7,13)
24	Carbazole	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26)
25	Carbon disulfide	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(12,25)
26	Carbon tetrachloride	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(12,25)
27	Chlordane	1) Ultrasonic Extraction, Gas Chromatographic Method ^(10,22) 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26)
28	p-Chloroaniline	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26)
29	Chlorobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(12,25)
30	Chlorodibromomethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(12,25)

31 Chloroform...

ลำดับ	สารมลพิษ	วิธีวิเคราะห์
60	2,4-Dinitrophenol	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26)
61	2,4-Dinitrotoluene	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26)
62	2,6-Dinitrotoluene	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26)
63	Di-n-Octyl phthalate	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26)
64	Endosulfan	1) Ultrasonic Extraction, Gas Chromatographic Method ^(10,22) 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26)
65	Endrin	1) Ultrasonic Extraction, Gas Chromatographic Method ^(10,22) 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26)
66	Ethylbenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(12,25)
67	Fluoranthene	1) Ultrasonic Extraction, Gas Chromatographic Method ^(10,24) 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26)
68	Fluorene	1) Ultrasonic Extraction, Gas Chromatographic Method ^(10,24) 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26)
69	Heptachlor	1) Ultrasonic Extraction, Gas Chromatographic Method ^(10,22) 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26)
70	Heptachlor epoxide	1) Ultrasonic Extraction, Gas Chromatographic Method ^(10,22) 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26)

UNITED ANALYST AND ENGINEERING CONSULTANT COMPANY LIMITED

ลำดับ	สารมลพิษ	วิธีวิเคราะห์
43	Di-n-butyl phthalate	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26)
44	1,2-Dichlorobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(12,25)
45	1,3-Dichlorobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(12,25)
46	1,4-Dichlorobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(12,25)
47	3,3'-Dichlorobenzidine	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26)
48	1,1-Dichloroethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(12,25)
49	1,2-Dichloroethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(12,25)
50	1,1-Dichloroethylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(12,25)
51	cis-1,2-Dichloroethylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(12,25)
52	trans-1,2-Dichloroethylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(12,25)
53	2,4-Dichlorophenol	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26)
54	1,2-Dichloropropane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(12,25)
55	1,3-Dichloropropane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(12,25)
56	1,3-Dichloropropene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(12,25)
57	Dieldrin	1) Ultrasonic Extraction, Gas Chromatographic Method ^(10,22) 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26)
58	Diethyl phthalate	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26)
59	2,4-Dimethylphenol	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26)

UNITED ANALYST AND ENGINEERING CONSULTANT COMPANY LIMITED

ลำดับ	สารมลพิษ	วิธีวิเคราะห์
83	Mercury	1) Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ⁽¹⁸⁾ 2) Digestion, Inductively Coupled Plasma Method ^(7,13) 3) Thermal Decomposition Amalgamation and Atomic Absorption Spectrometric Method ⁽¹⁹⁾
84	Methanol	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(12,25)
85	Methoxychlor	1) Ultrasonic Extraction, Gas Chromatographic Method ^(10,22) 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26)
86	Methyl bromide	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(12,25)
87	Methylene chloride	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(12,25)
88	2-Methylphenol	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26)
89	2-Methylnaphthalene	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26)
90	Methyl tert-butyl ether	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(12,25)
91	Naphthalene	1) Ultrasonic Extraction, Gas Chromatographic Method ^(10,24) 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26)
92	Nickel	1) Digestion, Flame Atomic Absorption Spectrometric Method ^(7,14) 2) Digestion, Inductively Coupled Plasma Method ^(7,13)
93	Nitrobenzene	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26)
94	N-Nitrosodiphenylamine	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26)
95	N-Nitrosodi-n-propylamine	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26)

96 Polychlorinated Biphenyls...

ลำดับ	สารมลพิษ	วิธีวิเคราะห์
71	Hexachlorobenzene	1) Ultrasonic Extraction, Gas Chromatographic Method ^(10,22) 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26)
72	Hexachloro-1,3-butadiene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(12,25)
73	n-Hexane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(12,25)
74	α -HCH	1) Ultrasonic Extraction, Gas Chromatographic Method ^(10,22) 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26)
75	β -HCH	1) Ultrasonic Extraction, Gas Chromatographic Method ^(10,22) 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26)
76	γ -HCH	1) Ultrasonic Extraction, Gas Chromatographic Method ^(10,22) 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26)
77	Hexachlorocyclopentadiene	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26)
78	Hexachloroethane	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26)
79	Indeno(1,2,3-cd)pyrene	1) Ultrasonic Extraction, Gas Chromatographic Method ^(10,24) 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26)
80	Isophorone	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26)
81	Lead	1) Digestion, Flame Atomic Absorption Spectrometric Method ^(7,14) 2) Digestion, Inductively Coupled Plasma Method ^(7,13)
82	Manganese	1) Digestion, Flame Atomic Absorption Spectrometric Method ^(7,14) 2) Digestion, Inductively Coupled Plasma Method ^(7,13)

83 Mercury...

ลำดับ	สารมลพิษ	วิธีวิเคราะห์
97	- 2,2',3,4',5,5',6'-Heptachlorobiphenyl - 2,2',3,3',4,4',5,5',6'-Nonachlorobiphenyl Pentachlorophenol	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26) 1) Ultrasonic Extraction, Gas Chromatographic Method ^(10,24) 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26)
98	Phenanthrene	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26)
99	Phenol	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26)
100	Pyrene	1) Ultrasonic Extraction, Gas Chromatographic Method ^(10,24) 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26)
101	Selenium	1) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^(7,22) 2) Digestion, Inductively Coupled Plasma Method ^(7,13)
102	Silver	Digestion, Inductively Coupled Plasma Method ^(7,13)
103	Styrene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(12,25)
104	1,1,1,2,2-Tetrachloroethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(12,25)
105	Tetrachloroethylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(12,25)
106	Toluene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(12,25)
107	Toxaphene	Ultrasonic Extraction, Gas Chromatographic Method ^(10,22)
108	TPH (C ₅ -C ₈)	1) Purge and Trap, Gas Chromatographic Method ^(12,21) 2) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(12,25)
109	TPH (C ₈ -C ₁₆)	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,21)
110	TPH (C ₁₆ -C ₃₅)	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,21)
111	1,2,4-Trichlorobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(12,25)

112 1,1,1-Trichloroethane...

ลำดับ	สารมลพิษ	วิธีวิเคราะห์
96	Polychlorinated Biphenyls - Aroclor 1016 - Aroclor 1221 - Aroclor 1232 - Aroclor 1242 - Aroclor 1248 - Aroclor 1254 - Aroclor 1260 Polychlorinated Biphenyls - 2-Chlorobiphenyl - 2,3-Dichlorobiphenyl - 2,2',5-Trichlorobiphenyl - 2,4',5-Trichlorobiphenyl - 2,2',3,5'-Tetrachlorobiphenyl - 2,2',5,5'-Tetrachlorobiphenyl - 2,3',4,4'-Tetrachlorobiphenyl - 2,2',3,4,5'- Pentachlorobiphenyl - 2,2',4,5,5'- Pentachlorobiphenyl - 2,3,3',4',6'- Pentachlorobiphenyl - 2,2',3,4,4',5'- Hexachlorobiphenyl - 2,2',3,4,5,5'- Hexachlorobiphenyl - 2,2',3,5,5',6'- Hexachlorobiphenyl - 2,2',4,4',5,5'- Hexachlorobiphenyl - 2,2',3,3',4,4',5'- Heptachlorobiphenyl - 2,2',3,4,4',5,5'- Heptachlorobiphenyl - 2,2',3,4,4',5,6'- Heptachlorobiphenyl	1) Ultrasonic Extraction, Gas Chromatographic Method ^(10,23) 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26) Ultrasonic Extraction, Gas Chromatographic Method ^(10,23)

3. สมาคมวิศวกรรมสิ่งแวดล้อมแห่งประเทศไทย. คู่มือวิเคราะห์น้ำเสีย. พิมพ์ครั้งที่ 4. กรุงเทพฯ: เรือนแก้วการพิมพ์, 2547.
4. APHA, AWWA, WEF. **Standard Methods for the Examination of Water and Wastewater**. 23rd ed. Washington, DC: APHA, 2017.
5. United States Environmental Protection Agency. **Standards of Performance for New Stationary Sources**. 40 CFR 60. Appendix A, 2019.
6. United States Environmental Protection Agency. **Test Methods for Evaluation Solid Waste Physical/Chemical Methods**. SW-846, 1997.
7. United States Environmental Protection Agency. **Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Acid Digestion of Sediments, Sludges, and Soils. SW-846 Method 3050B**, 1996.
8. United States Environmental Protection Agency. **Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Alkaline Digestion for Hexavalent Chromium. SW-846 Method 3060A**, 1996.
9. United States Environmental Protection Agency. **Test Methods for Evaluation Solid Waste 3. Physical/Chemical Methods. Separatory Funnel Liquid-Liquid Extraction. SW-846 Method 3510C**, 1996.
10. United States Environmental Protection Agency. **Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Ultrasonic Extraction. SW-846 Method 3550C**, 2007.
11. United States Environmental Protection Agency. **Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Purge and Trap for Aqueous Samples. SW-846 Method 5030C**, 2003.
12. United States Environmental Protection Agency. **Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Closed System Purge and Trap and Extraction for Volatile Organics in Soil and Waste Sample. SW-846 Method 5035A**, 2000.
13. United States Environmental Protection Agency. **Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Inductively Coupled Plasma-Optical Emission Spectrometry. SW-846 Method 6010D**, 2014.
14. United States Environmental Protection Agency. **Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Flame Atomic Absorption Spectrophotometry. SW-846 Method 7000B**, 2007.
15. United States Environmental Protection Agency. **Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Arsenic (Atomic Absorption, Gas Method 7061A**, 1992. 

16. United States...

ลำดับ	สารมลพิษ	วิธีวิเคราะห์
112	1,1,1-Trichloroethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(12,25)
113	1,1,2-Trichloroethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(12,25)
114	Trichloroethylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(12,25)
115	2,4,5-Trichlorophenol	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26)
116	2,4,6-Trichlorophenol	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26)
117	1,3,5-Trimethylbenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(12,25)
118	Vanadium	Digestion, Inductively Coupled Plasma Method ^(7,13)
119	Vinyl acetate	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(12,25)
120	Vinyl chloride	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(12,25)
121	m-Xylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(12,25)
122	o-Xylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(12,25)
123	p-Xylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(12,25)
124	Xylene (Total)	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(12,25)
125	Zinc	1) Digestion, Flame Atomic Absorption Spectrometric Method ^(7,14) 2) Digestion, Inductively Coupled Plasma Method ^(7,13)

เอกสารอ้างอิง

1. กระทรวงอุตสาหกรรม. ประกาศกระทรวงอุตสาหกรรม. พ.ศ. 2549. เรื่อง คำว่าที่เจือปนในเอกสารที่ขายออกจากรถยนต์ของประเทศไทยให้ถือว่าเป็นเชื้อเพลิงจากพืช. 4 ธันวาคม 2549. เล่มที่ 123-2013/พ.ศ. 2549. เรื่อง ราชกิจจานุเบกษา.
2. กระทรวงอุตสาหกรรม. ประกาศกระทรวงอุตสาหกรรม. พ.ศ. 2549. เรื่อง หรือวัสดุที่ไม่ใช้แล้ว. ราชกิจจานุเบกษา. 25 มกราคม 2549. เล่มที่ 123 ตอนพิเศษ



28. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. **Total and Amenable Cyanide : Distillation. SW-846 Method 9010C**, 2004.
29. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. **Cyanide Extraction Procedure for Solids and Oils. SW-846 Method 9013A**, 2014.
30. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. **Cyanide in Waters and Extracts using Titrimetric and Manual Spectrophotometric Procedures. SW-846 Method 9014**, 2014.
31. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. **pH Electrometric Measurement. SW-846 Method 9040C**, 2004.
32. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. **Soil and Waste pH. SW-846 Method 904D**, 2004.



16. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. **Chromium, Hexavalent (Colorimetric)**. SW-846 Method 7196A, 1992.
17. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. **Mercury in Liquid Waste (Manual Cold Vapor Technique)**. SW-846 Method 7470A, 1994.
18. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. **Mercury in Solid or Semisolid Waste (Manual Cold-Vapor Technique)**. SW-846 Method 7471B, 1998.
19. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. **Mercury in Solids and Solutions by Thermal Decomposition, Amalgamation, and Atomic Absorption Spectrophotometry**. SW-846 Method 7473, 2007.
20. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. **Selenium (Atomic Absorption, Borohydride Reduction)**. SW-846 Method 7742, 1994.
21. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. **Nonhalogenated Organics Using GC/FID**. SW-846 Method 8015D, 2003.
22. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. **Organochlorine Pesticides by Gas Chromatography**. SW-846 Method 8081B, 2007.
23. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. **Polychlorinated Biphenyls (PCBs) by Gas Chromatography**. SW-846 Method 8082A, 2007.
24. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. **Polynuclear Aromatic Hydrocarbons**. SW-846 Method 8100, 1980.
25. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. **Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry**. SW-846 Method 8260D, 2018.
26. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. **Semivolatile Organic Compounds Chromatography/Mass Spectrometry**. SW-846 Method 8270C, 2018.
27. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. **Chlorinated Biphenyls by Gas Chromatography/Mass Spectrometry**. SW-846 Method 8315A, 1994.

Calibration Report

Certificate No.: 2402420-001-01
Equipment: Electronic Balance
Manufacturer: METTLER TOLEDO
Model: AB204-S/FACT
Resolution: 0.0001 g
Serial No.: B108115858
ID No.: UAE.AIR.016/2555
Capacity: 220 g

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Date of Calibration: 19 April 2024
Environment Condition: Ambient Temperature: 22.1 ± 0.6 °C Relative Humidity: 49 ± 1.9 %
Place of Calibration: Room 206 Balance Room 2, UNITED ANALYST AND ENGINEERING CONSULTANT CO., LTD.

Condition of Equipment: Good Condition

Condition of This Results of Calibration:

1. Calibration Method: NFI Method W-MA-001 In-House Method based on UKAS Lab 14 : 2019

2. Reference Standards:

Reference Standard	Model	Serial No.	Calibrated By	Certificate No.	Due Date
Standard Weight Class E2	1-500mg	15880	TCS	M2311181S	28 November 2024
Standard Weight Class E2	1-500g	15882	TCS	M2311182S	28 November 2024
Instrument	Model	Serial No.	Calibrated By	Certificate No.	Due Date
Thermo-Hygro Meter	608-H1	NFI.BTH.019/23	Quality Reborn	QR24-0492	4 March 2025

3. This certification is traceable to SI UNIT

4. This certificate was certified only for the instrument we calibrated.

5. This result of calibration was found accurate as shown on date and place of calibration only.

Calibration Results:

1. Repeatability of Reading:

Nominal Value (g)	Standard Deviation of Reading (g)
100	0.000057
200	0.000079

2. Off-Center Error:

A mass of 100 g was placed and moved to various position on pan.

The balance reading obtained is given in the table.

1	2	3	4	5	6	(Maximum Difference)
(g)	(g)	(g)	(g)	(g)	(g)	(g)
99.9999	99.9997	99.9996	99.9998	100.0000	99.9998	0.0003

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

Calibration Certificate

Certificate No.: 2402420-001-01
Client name: UNITED ANALYST AND ENGINEERING CONSULTANT CO., LTD.
Address: 3 Soi Udomsuk 41, Sukhumvit Road,
Bangchack, Prakhnong, Bangkok 10260

Page 1 of 3

Equipment: Electronic Balance

Manufacturer: METTLER TOLEDO

Model: AB204-S/FACT

Serial No.: B108115858

ID No.: UAE.AIR.016/2555

Order No.: 2402420

Operation No.: 2402420-001

Date of Receipt: 19 April 2024

Date of Calibration: 19 April 2024

Calibrated by

Scientist

Approved by

Vice President, Department of Laboratory Services
Responsible for the Technical Management Team

Date of Issue: 23 April 2024

The uncertainties are for a confidence probability of approximately 95%

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation Scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the units of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the National Food Institute.

F-CS-009 Revision: 01 Date: 20-04-65

REPORT OF CALIBRATION

Certificate No. : SP24-018

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Wavelength Accuracy :

CRMs Values (nm.)	UUC Reading (nm.)	Correction (nm.)	Uncertainty (nm.)	Coverage factor <i>k</i>
241.72	242.0	-0.28	0.18	2.00
279.45	279.5	-0.05	0.18	2.00
287.81	287.9	-0.09	0.18	2.00
334.06	333.9	0.16	0.18	2.00
360.93	360.5	0.43	0.18	2.00
418.59	418.1	0.49	0.18	2.00
445.94	445.6	0.34	0.18	2.00
453.66	453.3	0.36	0.18	2.00
460.02	459.8	0.22	0.18	2.00
536.59	536.0	0.59	0.18	2.00
637.98	638.7	-0.72	0.18	2.00
431.38	430.8	0.58	0.18	2.00
472.50	472.4	0.10	0.18	2.00
513.47	513.7	-0.23	0.18	2.00
528.88	529.1	-0.22	0.18	2.00
573.17	573.5	-0.33	0.18	2.00
585.35	585.2	0.15	0.20	2.00
684.40	685.1	-0.70	0.18	2.00
740.72	741.4	-0.68	0.20	2.00
748.55	749.1	-0.55	0.18	2.00
807.03	807.3	-0.27	0.18	2.00
879.28	879.3	-0.02	0.18	2.00

Remark : - UUC = Unit Under Calibration

- N/A = Not Available

- The result expanded uncertainty of measurement U is stated as the standard uncertainty of measurement multiplied by the coverage factor *k*, which for a normal distribution corresponds to a coverage probability of approximately 95%

- * Indicates non TISI accredited

- End of Certificate -

เอกสารไม่ควบคุม
 Not for Control Document

REPORT OF CALIBRATION

Certificate No. : SP24-018

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Photometric Accuracy :

Wavelength (nm.)	CRMs Values (Abs)	UUC Reading (Abs)	Correction (Abs)	Uncertainty (Abs)	Coverage factor <i>k</i>
235	0.0000	0.0000	0.0000	0.0050	2.00
	0.7469	0.7435	0.0034	0.0057	2.00
257	0.0000	0.0000	0.0000	0.0050	2.00
	0.8674	0.8639	0.0035	0.0060	2.00
313	0.0000	0.0000	0.0000	0.0050	2.00
	0.2919	0.2907	0.0012	0.0051	2.00
350	0.0000	0.0000	0.0000	0.0050	2.00
	0.6430	0.6402	0.0028	0.0055	2.00



Equipment : Hot Air Oven
Condition As-Received : Used Item
Reference : 2404-0004OC-3

Procedure Used :-

Calibration were conducted using calibration procedure CP-OT02 based on TLAS G-20 according to direct measurement method with Data Acquisition which connected with Resistance Temperature Detector (RTD) and Thermocouple Type T.

The temperature scale used was based on ITS-90.

Condition of this result of calibration

1. Reference standard Instrument:-

Instrument	Serial No.	Cert. No.	Traceable	Due Date
1) Data Acquisition	MY57013711	23LM115	TPA	11 Jul 2024

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

3. This certification is traceable to the International System of Unit.

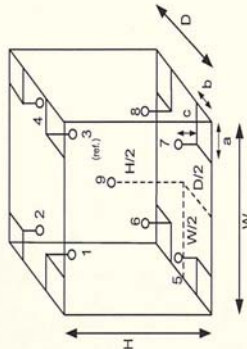
Remark : TPA : Technology Promotion Association (Thailand - Japan)

Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source

Fresh air setting : Close

Environment during calibration		
	Beginning	Finished
Temp. (°C)	27	26
REL.Humid. (%)	47	48
AC Supply (Volt)	221	220



Probe Installation Details :

a =	5.0	cm
b =	5.0	cm
c =	5.0	cm

Dimension of Chamber :

D =	0.50	m
W =	0.80	m
H =	0.75	m
Capacity =	0.30	m ³

Ref. Std. ID No.: @ Calibration Point		
Position :	(120 to 180) °C	(104) °C
1	21-18TC-01	22-18RTD-2/1
2	21-18TC-02	18RTD-2/2
3	21-18TC-03	18RTD-2/3
4	21-18TC-04	18RTD-2/4
5	21-18TC-05	18RTD-2/5
6	21-18TC-06	18RTD-2/6
7	21-18TC-07	18RTD-2/7
8	21-18TC-08	18RTD-2/8
9 (ref.)	21-18TC-09	18RTD-2/9



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250
TEL. 0-2717-3000-29 FAX. 0-2719-9484



Cert. No.: 24TM589
Page : 1 of 3

Certificate of Calibration

Equipment : Hot Air Oven

Manufacturer : Memmert

Model : UF 55

Serial No. : B212.0411

ID No. : UAE.WAO.005/2556

Submitted by : United Analyst and Engineering Consultant Co.,Ltd.
3 Soi Udomsuk 41, Sukhumvit Road,
Bangchak, Phrakhanong,
Bangkok 10260
Location : Lab Floor 2

Received Order : 01 April 2024

Calibration Date : 01 - 02 April 2024

Ambient Temperature : (26 ± 10) °C

Relative Humidity : (50 ± 30) %

Calibrated by : Krisda Malee

Approved by :

() Ponpan Paipim

(✓) Suwit Imjai

() Kunchit Promprat

Issue Date : 5 April 2024

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.

เอกสารนี้ไม่ได้
a 1209739

เอกสารนี้ไม่ได้
A 0065065



Request No. 25-67 / 0275

MTC. ACL.No. 358 / 67

CALIBRATION CERTIFICATE

NOMENCLATURE : 1. Atomic Absorption Spectrophotometer "Agilent Technologies"

Model AA240FS, Serial No. MY13160001

2. Working standard solution "Inorganic Ventures"

Multi Analyte Custom Grade Solution, Lot No. S2-MEB675610

SUBMITTED BY : United Analyst and Engineering Consultant Co., Ltd.

3 Soi Udomsuk 41, Sukhumvit Road, Bangchak, Prakanong, Bangkok 10260

CALIBRATION PROCEDURE : 1. Performance Verification of Atomic Absorption Spectrophotometer

(WI-500-02-30)

2. Estimation Uncertainty of Measurement in Analytical Chemistry (QP-513)

CALIBRATION RANGE: 0.02, 0.10, 0.30, 0.50, 0.70 mg/l at 228.8 nm.Cd, 0.10, 0.20, 0.30, 0.50, 0.70 mg/l at 357.9 nm.Cr, 0.05, 0.10, 0.30, 0.50, 0.70 mg/l at 324.7 nm.Cu, 0.10, 0.30, 0.50, 0.70, 1.00 mg/l at 248.3 nm.Fe, 0.20, 0.50, 0.70, 1.00, 1.50 mg/l at 217.0 nm.Pb, 0.05, 0.10, 0.30, 0.50, 0.70 mg/l at 279.5 nm.Mn, 0.10, 0.30, 0.50, 0.70, 1.00 mg/l at 232.0 nm.Ni, 0.05, 0.10, 0.30, 0.50, 0.70 mg/l at 213.9 nm.Zn

CALIBRATION DATE : 2 February 2024

REFERENCE MATERIAL : Traceable to NIST "Agilent Technologies", "CARLO ERBA"

Cadmium Lot No. 0006589926, Chromium Lot No. 0112384886, Copper Batch No. T117098A, Iron Batch No. T126087A,

Lead Lot No. 1227873, Manganese Batch No. T109228A, Nickel Batch No. T270178A, Zinc Batch No. T820140A

AMBIENT CONDITIONS : Temperature $25 \pm 5^\circ\text{C}$ Relative humidity $50 \pm 20\%$

The Atomic Absorption Spectrophotometer has been calibrated against Reference Material traceable to National Institute of Standards and Technology (NIST) by The Analytical Chemistry Laboratory.

The results are attached herewith.

Calibrated by

.....

Approved by

.....

Director of Analytical Chemistry Laboratory

Ref. 2015267020100454001

Issued Date : 11 March 2024

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FM.BL.MTC.002 Rev.4



Equipment : Hot Air Oven
Condition As-Received : Used Item
Reference : 2404-0004OC-3
Function of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source
Fresh air setting : Close

Cert. No.: 24TW589
Page : 3 of 3

Calibration Point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Temperature stability (± °C)	Temperature uniformity (°C)	Overall Variation (°C)	Coverage Factor k
104.0	104.0	104.0	0.032	0.47	0.84	2
120.0	120.0	120.0	0.12	0.72	1.3	2
180.0	180.0	180.0	0.13	1.2	1.5	2

Calibration Point (°C)	Measured Temperature (°C)									Uncertainty (± °C)
	Position									
	1	2	3	4	5	6	7	8	9 (ref.)	
104.0	104.464	103.847	104.226	104.232	104.106	103.691	104.275	104.127	104.013	0.42
120.0	120.486	120.089	120.635	120.596	119.531	119.644	120.364	120.144	120.158	1.1
180.0	180.574	179.769	180.285	180.870	179.594	179.790	180.287	179.961	179.802	1.1

Average* : The average of 30 values in each position.

Temperature stability : One-half of the greatest maximum difference of measured temperature at any one sensor.

Temperature uniformity : The maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time or at as close an observation time as possible to determine the temperature pattern or homogeneity within the chamber under steady-state conditions.

Overall Variation : The Difference of the maximum and minimum measured temperatures throughout observation.

UUC* : Unit Under Calibration

Note : The reported uncertainty of measurement was included stability and excluded uniformity .

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

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MTC. ACL No. 358 / 67

2. Precision

Element	Conc. (mg/l)	Absorbance										Ave. Abs.	SD	%RSD
		0.0078	0.0076	0.0069	0.0075	0.0071	0.0070	0.0076	0.0074	0.0077	0.0067	0.0067	0.0004	5.15
Cd	0.30	0.1008	0.1007	0.0999	0.0997	0.1000	0.0996	0.1008	0.1002	0.1005	0.0999	0.100	0.0005	0.46
	0.70	0.2301	0.2306	0.2277	0.2305	0.2310	0.2295	0.2290	0.2293	0.2305	0.2296	0.230	0.0010	0.42
	0.10	0.0094	0.0093	0.0093	0.0098	0.0094	0.0095	0.0090	0.0090	0.0094	0.0090	0.009	0.0003	2.75
Cr	0.30	0.0241	0.0236	0.0221	0.0238	0.0231	0.0226	0.0231	0.0223	0.0230	0.0231	0.023	0.0006	2.75
	0.70	0.0500	0.0500	0.0500	0.0524	0.0499	0.0511	0.0509	0.0512	0.0515	0.0504	0.051	0.0008	1.63
	0.05	0.0061	0.0062	0.0064	0.0061	0.0069	0.0069	0.0061	0.0062	0.0064	0.0061	0.006	0.0003	5.00
Cu	0.30	0.0419	0.0411	0.0402	0.0407	0.0405	0.0404	0.0399	0.0400	0.0399	0.0400	0.040	0.0006	1.58
	0.70	0.0960	0.0960	0.0960	0.0959	0.0947	0.0955	0.0952	0.0952	0.0951	0.0955	0.096	0.0005	0.48
	0.10	0.0096	0.0101	0.0103	0.0100	0.0099	0.0096	0.0106	0.0099	0.0105	0.0102	0.010	0.0003	3.38
Fe	0.50	0.0424	0.0415	0.0428	0.0427	0.0421	0.0426	0.0413	0.0430	0.0421	0.0419	0.042	0.0006	1.33
	1.00	0.0830	0.0839	0.0847	0.0834	0.0832	0.0820	0.0839	0.0838	0.0837	0.0845	0.084	0.0008	0.92
	0.20	0.0078	0.0074	0.0078	0.0078	0.0076	0.0078	0.0077	0.0078	0.0078	0.0077	0.008	0.0001	1.71
Pb	0.70	0.0278	0.0273	0.0271	0.0267	0.0270	0.0264	0.0274	0.0273	0.0269	0.0269	0.027	0.0004	1.45
	1.50	0.0551	0.0548	0.0552	0.0555	0.0547	0.0546	0.0544	0.0544	0.0549	0.0547	0.055	0.0004	0.64
	0.05	0.0116	0.0107	0.0110	0.0103	0.0108	0.0108	0.0112	0.0107	0.0109	0.0108	0.011	0.0003	3.15
Mn	0.30	0.0650	0.0649	0.0649	0.0651	0.0646	0.0646	0.0649	0.0646	0.0640	0.0648	0.065	0.0003	0.48
	0.70	0.1463	0.1465	0.1459	0.1471	0.1475	0.1474	0.1487	0.1473	0.1462	0.1468	0.147	0.0008	0.56
	0.10	0.0095	0.0100	0.0096	0.0103	0.0102	0.0096	0.0100	0.0095	0.0097	0.0096	0.010	0.0003	3.04
Ni	0.50	0.0443	0.0433	0.0438	0.0444	0.0430	0.0437	0.0444	0.0437	0.0438	0.0434	0.044	0.0005	1.09
	1.00	0.0812	0.0820	0.0834	0.0829	0.0818	0.0829	0.0831	0.0835	0.0816	0.0819	0.082	0.0008	0.99
	0.05	0.0374	0.0377	0.0373	0.0377	0.0374	0.0377	0.0373	0.0371	0.0371	0.0374	0.037	0.0002	0.61
Zn	0.30	0.1985	0.1993	0.1975	0.1992	0.1979	0.1988	0.1995	0.1985	0.1974	0.2004	0.199	0.0009	0.47
	0.70	0.4027	0.4031	0.4019	0.4021	0.4023	0.3981	0.4042	0.4025	0.3993	0.3997	0.402	0.0019	0.47

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CALIBRATION DATA

1. Noise Level

Element	Cd	Cr	Cu	Fe	Pb	Mn	Ni	Zn
Absorbance	0.0006	0.0004	-0.0003	0.0001	-0.0011	-0.0005	0.0008	0.0004
	0.001	0.0017	-0.0009	0.0008	0.0001	0.0002	-0.0003	0.0007
	0.0006	0.0017	-0.0020	0.0005	0.0005	0.0004	0.0013	0.0014
	0.0001	0.0018	-0.0007	0.0005	0.0004	-0.0003	-0.0001	0.0010
	-0.0001	0.0019	-0.0014	0.0003	0.0010	0.0000	0.0002	-0.0001
	0.0011	0.0014	-0.0017	0.0009	-0.0008	0.0004	0.0006	0.0010
	-0.0002	0.0015	-0.0015	0.0003	0.0002	-0.0008	0.0009	0.0013
	0.0006	0.0012	-0.0001	0.0006	0.0008	0.0001	-0.0002	0.0013
	0.0008	0.0009	-0.0003	0.0003	0.0005	0.0002	0.0001	0.0007
	0.0012	0.0011	-0.0012	0.0008	0.0003	0.0004	0.0004	0.0013
Average Absorbance	0.0003	0.0015	-0.0019	0.0001	-0.0002	0.0000	-0.0003	0.0003
	0.0005	0.0017	-0.0019	-0.0007	0.0000	-0.0007	0.0005	0.0005
	-0.0006	0.0016	0.0000	0.0006	-0.0001	0.0013	0.0006	0.0010
	0.0003	0.0011	-0.0002	0.0001	-0.0007	0.0009	0.0009	0.0002
	0.0003	0.0012	-0.0011	0.0007	-0.0003	-0.0003	0.0010	0.0009
	0.0004	0.0018	-0.0016	-0.0004	-0.0006	0.0008	0.0007	0.0007
	-0.0001	0.0018	-0.0018	0.0013	-0.0006	-0.0001	0.0014	0.0006
	0.0003	0.0017	-0.0001	0.0001	-0.0012	-0.0004	0.0001	0.0002
	0.0010	0.0018	-0.0007	0.0003	-0.0005	-0.0002	0.001	0.0003
	0.0004	0.0019	-0.0008	-0.0001	-0.0004	0.0003	0.0002	0.0008

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3.4 Reading on wavelength- Iron (Fe) at 248.3 nm.

Element	Standard Value of RM (mg/l)	Reading (mg/l)	Error of Measurement (mg/l)	Error of Measurement (%)	Uncertainty (mg/l)
Fe	0.100	0.104	0.005	4.60	± 0.014
	0.500	0.482	-0.018	3.55	± 0.016
	1.006	0.968	-0.038	3.75	± 0.029

3.5 Reading on wavelength- Lead (Pb) at 217.0 nm.

Element	Standard Value of RM (mg/l)	Reading (mg/l)	Error of Measurement (mg/l)	Error of Measurement (%)	Uncertainty (mg/l)
Pb	0.201	0.202	0.001	0.34	± 0.014
	0.706	0.719	0.012	1.73	± 0.030
	1.513	1.459	-0.054	3.57	± 0.061

3.6 Reading on wavelength- Manganese (Mn) at 279.5 nm.

Element	Standard Value of RM (mg/l)	Reading (mg/l)	Error of Measurement (mg/l)	Error of Measurement (%)	Uncertainty (mg/l)
Mn	0.0505	0.050	0.000	0.83	± 0.005
	0.3031	0.306	0.003	1.12	± 0.007
	0.7023	0.698	-0.004	0.62	± 0.005

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Request No. 25-67 / 0275

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MTC. ACL. No. 358 / 67

3. Trueness

3.1 Reading on wavelength- Cadmium(Cd) at 228.8 nm.

Element	Standard Value of RM (mg/l)	Reading (mg/l)	Error of Measurement (mg/l)	Error of Measurement (%)	Uncertainty (mg/l)
Cd	0.020	0.020	0.000	1.10	± 0.005
	0.301	0.301	0.000	0.11	± 0.005
	0.707	0.693	-0.013	1.85	± 0.008

3.2 Reading on wavelength- Chromium (Cr) at 357.9 nm.

Element	Standard Value of RM (mg/l)	Reading (mg/l)	Error of Measurement (mg/l)	Error of Measurement (%)	Uncertainty (mg/l)
Cr	0.1007	0.104	0.004	3.49	± 0.009
	0.3035	0.297	-0.006	2.11	± 0.012
	0.7071	0.685	-0.023	3.19	± 0.023

3.3 Reading on wavelength- Copper (Cu) at 324.7 nm.

Element	Standard Value of RM (mg/l)	Reading (mg/l)	Error of Measurement (mg/l)	Error of Measurement (%)	Uncertainty (mg/l)
Cu	0.051	0.047	-0.004	7.58	± 0.003
	0.303	0.296	-0.007	2.19	± 0.009
	0.704	0.698	-0.005	0.74	± 0.005

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Agilent 5110 and 5100 ICP-OES
Preventive Maintenance Checklist

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

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

Customer Information

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

Service Engineer's Responsibilities

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



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MTC. ACL No. 358 / 67

3.7 Reading on wavelength- Nickel (Ni) at 232.0 nm.

Element	Standard Value of RM (mg/l)	Reading (mg/l)	Error of Measurement (mg/l)	Error of Measurement (%)	Uncertainty (mg/l)
Ni	0.101	0.098	-0.003	2.90	± 0.013
	0.508	0.502	-0.006	1.16	± 0.018
	1.012	0.962	-0.051	5.02	± 0.032

3.8 Reading on wavelength- Zinc (Zn) at 213.9 nm.

Element	Standard Value of RM (mg/l)	Reading (mg/l)	Error of Measurement (mg/l)	Error of Measurement (%)	Uncertainty (mg/l)
Zn	0.050	0.045	-0.005	9.39	± 0.013
	0.303	0.324	0.021	7.04	± 0.013
	0.707	0.675	-0.032	4.52	± 0.019

Remark : The reported uncertainty is an expanded uncertainty calculated using a coverage factor of 2 (k = 2)

which gives a level of confidence of approximately 95%

Calibrated by

Approved

Director of Analytical Chemistry Laboratory

Issued Date : 11 March 2024

INDUSTRIAL METROLOGY AND TESTING SERVICE CENTRE

End of Certificate

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Agilent 5110 and 5100 ICP-OES Preventive Maintenance Checklist

General Preparation

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

Inspect and clean the system

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

G8481A Cooling water system

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



Agilent 5110 and 5100 ICP-OES Preventive Maintenance Checklist

System Information

Instrument system name and ID	ICP 5110 VDV
Instrument system site and location	UAE / 3rd Floor Laboratory
List system component product numbers	List the serial numbers of each component
1. G 8015 A	1. MY 18030001
2. G 8481 A	2. 1801-01988
3.	3.
4.	4.
5.	5.
6.	6.
7.	7.
8.	8.
9.	9.
10.	10.

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

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

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

Instrument Performance Test Results Table

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

	Pre PM Sensitivity Check		Post PM Sensitivity Check	
	Radial	Axial *	Radial	Axial *
Zn 213.857 nm SRBR	4100.6	8364.0	4375.0	8400.8
Mn 257.610 nm SRBR	11064.7	31842.1	12801.7	30846.2
Al 396.152 nm SBR	7.5	14.9	9.9	16.8
K 766.491 nm SBR	5.1	36.8	6.4	33.7

* Axial result is not applicable for G8016AA, G8012AA Radial View instruments.

Instrument Test Results Table

Note: The Instrument Test results are for systems using ICP Expert version 7.3 and above only.

Instrument Test	Result
Subsystem Communications Test	Pass
Air Flow	Pass
Water Flow	Pass
Gas Flows	Pass
RF Generator	Pass
Camera Test	Pass
Optics Test	Pass
Nebulizer test	Pass

**Agilent 5110 and 5100 ICP-OES
Preventive Maintenance Checklist**
SPS 3 Auto Sampler

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

SPS 4 Auto Sampler

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

AVS 4. 6. 7

- ☒ Section NOT Applicable
☐ Replace valve rotor seal
☐ Check fittings for signs of leaks
☐ Check tubing including autosampler tubing for kinks or excessive wear
☐ Check high flow pump for signs of leaks

Instrument Adjustment

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



Agilent 5110 and 5100 ICP-OES Preventive Maintenance Checklist

ICP-OES Parts List Table

Part description	Part Number	Product /Model # where used	Quantity Consumed
Axial Pre-Optic Window	G8010-68014	G8010A, G8011A, G8014A/G8015A	1
Radial Pre-Optic Window	G8010-68015	All	1
Polyclear Cooling Fluid	G3292-80010	G8481A	
Purge Gas Filter	G8010-60136	All	1
Air inlet filter	G8000-68002	All	1
High Capacity Air Filter	G8010-60189	Optional	
Rotor seal for 6-7 port valve for AVS6/7	G8494-60002	G8494A/G8495	
Rotor seal for 4 port valve for AVS4	G8493-60002	G8493A	
Rinse solution to rinse station 2.5mm id x 1m	G8410-80123	SPS 4	
Barb connector 2.5mm-1.5mm ID	G8410-80124	SPS 4	
PVC waste tubing, 8mm od x 5mm id, 2m	G8410-80122	SPS 4	
Additional Parts may be required from engineers stock:			
X axis drive belt	5410047500	SPS 3	
Z axis drive belt	5410047400	SPS 3	
Peristaltic pump tubing, PVC SolvaFlex, 3 bridged,	3710049000	SPS 4	

Restore system

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

Leave system in an idle state: on and purging.

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

Service Review

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



Agilent 5110 and 5100 ICP-OES Preventive Maintenance Checklist

ICP-OES Status Results Table

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

Measurement	Standby Mode	Plasma On
Mains Voltage	224.540	217.973
Mains Current	0.204	0.104
Instrument Temperature	22.8	22.7
RF Air Flow (sensor speed)	15.0	13.0
Plasma Exhaust Temperature	No measurement	26.7
Water Flow Oscillator	No measurement	1.64
Water Flow Detector	1.06	1.06
Water Inlet Temperature	18.0	18.0
Polychromator Temperature	35.0	35.0
CCD Temperature	-33.8	-33.8
Thermal Stabilizer	35.0	35.0
Argon Supply Pressure	671.94	687.33
Purge Gas Supply Pressure*1	674.90	645.40
Option Gas Supply Pressure*1	N/A	N/A
Nebulizer Flow	No measurement	0.70
Nebulizer Back Pressure	No measurement	164.63
Plasma Gas Flow	No measurement	11.98
Auxiliary Gas Flow	No measurement	1.00
RF Power	No measurement	1800
RF Supply Current	No measurement	8.663
RF Supply Voltage	No measurement	164.660

*1 If option installed



Agilent 5110 and 5100 ICP-OES
Preventive Maintenance Checklist

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

Service Engineer Comments (optional)

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

Other Important Customer Web Links

How to get information on your product:

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

Service Completion

Service request number 600565987 Date service completed 30 NOV 2022

Agilent signature Customer signature

Document part number: G8014-90075

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เอกสารไม่ควบคุม

Report Summary

Instrument Model Agilent 5100/5110 VDV ICP-OES
Instrument ID G8011A/G8015A
Instrument Serial Number MY18030001
Software Version 7.3.1.9507
Firmware Version 3442
Tested By Test Before PM
Test Completed On 11/30/2022 9:35:32 AM

Result Summary

Subsystem Communications Test Skipped
Air Flow Test Skipped
Water Flow Test Skipped
Gas Flows Test Skipped
RF Generator Test Skipped
Camera Test Skipped
Optics Test Skipped
Advanced Valve System Test Skipped
Resolution Test Pass
Sensitivity Test Pass
Precision Test Pass

Sensitivity Test						Pass	
Radial							
Element Wavelength	Specification	Method	Ratio	Standard	Blank		
As (188.980 nm)	≥ 46.0	SRBR	147.7	1156.5	55.5		
Se (196.026 nm)	≥ 41.0	SRBR	111.1	1195.3	97.7		
Zn (213.857 nm)	≥ 1421.0	SRBR	4100.6	51959.5	159.6		
Pb (220.353 nm)	≥ 46.0	SRBR	192.5	2808.6	185.7		
Mn (257.610 nm)	≥ 3518.0	SRBR	11064.7	264165.0	567.6		
Al (396.152 nm)	≥ 3.4	SBR	7.5	49047.9	5770.5		
Ba (493.408 nm)	≥ 34.0	SBR	107.4	1887710.3	17407.5		
K (766.491 nm)	≥ 1.8	SBR	5.1	100805.9	16626.4		
Axial							
Element Wavelength	Specification	Method	Ratio	Standard	Blank		
As (188.980 nm)	≥ 208.0	SRBR	234.9	3056.4	152.9		
Se (196.026 nm)	≥ 159.0	SRBR	218.1	3885.1	271.6		
Zn (206.200 nm)	≥ 234.0	SRBR	1306.5	15850.4	144.5		
Zn (213.857 nm)	≥ 1743.0	SRBR	8364.0	183037.8	476.4		
Cd (214.439 nm)	≥ 4227.0	SRBR	7718.5	143240.2	342.8		
Pb (220.353 nm)	≥ 320.0	SRBR	576.3	14465.2	580.4		
Mn (257.610 nm)	≥ 10625.0	SRBR	31842.1	1411257.3	1958.9		
Cr (267.716 nm)	≥ 1048.0	SRBR	4492.1	183110.6	1632.2		
Cu (324.754 nm)	≥ 19.0	SBR	46.2	371487.5	7862.9		
Al (396.152 nm)	≥ 6.0	SBR	14.9	278447.4	17552.6		
Ba (493.408 nm)	≥ 60.0	SBR	190.6	10061527.3	52519.8		
K (766.491 nm)	≥ 24.0	SBR	36.8	1922163.4	50858.1		

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เอกสารไม่ควบคุม

Resolution Test			Pass
Element Wavelength	Specification	Width	
N (174.213 nm)	≤ 9.40	6.62	
As (188.980 nm)	≤ 8.20	6.20	
C (193.027 nm)	≤ 11.50	8.35	
Mo (202.032 nm)	≤ 8.20	6.41	
Cr (206.158 nm)	≤ 13.40	9.04	
Zn (213.857 nm)	≤ 8.70	6.62	
Pb (220.353 nm)	≤ 9.50	7.13	
Co (228.615 nm)	≤ 17.20	11.71	
Ba (230.424 nm)	≤ 9.40	7.21	
Mn (257.610 nm)	≤ 13.30	9.50	
Mn (260.568 nm)	≤ 20.30	14.33	
Cr (267.716 nm)	≤ 11.00	8.14	
Cu (324.754 nm)	≤ 25.00	18.98	
Cu (327.395 nm)	≤ 14.20	11.24	
Sr (338.071 nm)	≤ 33.50	24.47	
Ba (455.403 nm)	≤ 44.00	33.88	
Sr (460.733 nm)	≤ 36.00	17.22	
Ba (493.408 nm)	≤ 36.00	25.48	
Ba (614.171 nm)	≤ 42.00	25.47	
Ar (675.283 nm)	≤ 74.00	59.82	
K (766.491 nm)	≤ 80.00	64.94	

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เอกสารไม่ควบคุม

Report Summary			
Instrument Model	Agilent 5100/5110 VDV ICP-OES		
Instrument ID	G8011A/G8015A		
Instrument Serial Number	MY18030001		
Software Version	7.3.1.9507		
Firmware Version	3442		
Tested By	PMI Functional test		
Test Completed On	11/30/2022 11:43:36 AM		
Result Summary			
Subsystem Communications Test			
Air Flow Test	Pass		
Water Flow Test	Pass		
Gas Flows Test	Pass		
RF Generator Test	Pass		
Camera Test	Pass		
Optics Test	Skipped		
Advanced Valve System Test	Skipped		
Resolution Test	Skipped		
Sensitivity Test	Skipped		
Precision Test	Skipped		
Subsystem Communications Test			
Pass			
Air Flow Test			
30% Air Flow (relative speed)	75% Air Flow (relative speed)		
14.00	19.00		
Water Flow Test			
RF Water Flow(L/min)	Camera Water Flow (L/min)	Water Inlet Temperature (°C)	
1.44	1.05	18.51	

Precision Test

Radial

Element Wavelength	Specification	Measured Value % RSD
As (188.980 nm)	≤ 2.60	0.82
Se (196.026 nm)	≤ 2.60	0.71
Zn (213.857 nm)	≤ 1.50	0.43
Pb (220.353 nm)	≤ 2.60	0.76
Mn (257.610 nm)	≤ 1.50	0.60
Al (396.152 nm)	≤ 1.50	0.48
Ba (493.408 nm)	≤ 1.50	0.89
K (766.491 nm)	≤ 1.50	0.42

Axial

Element Wavelength	Specification	Measured Value % RSD
As (188.980 nm)	≤ 1.50	0.57
Se (196.026 nm)	≤ 1.50	0.76
Zn (206.200 nm)	≤ 1.50	0.61
Zn (213.857 nm)	≤ 1.50	0.51
Cd (214.439 nm)	≤ 1.50	0.55
Pb (220.353 nm)	≤ 1.50	0.52
Mn (257.610 nm)	≤ 1.50	0.54
Cr (267.716 nm)	≤ 1.50	0.54
Cu (324.754 nm)	≤ 1.50	0.69
Al (396.152 nm)	≤ 1.50	0.91
Ba (493.408 nm)	≤ 1.50	0.85
K (766.491 nm)	≤ 1.50	1.22

Pass

Report Summary		Agilent 5100/5110 VDV ICP-OES
Instrument Model		G8011A/G8015A
Instrument ID		MY18030001
Instrument Serial Number		7.3.1.9507
Software Version		3442
Firmware Version		PMI Performance test
Tested By		11/30/2022 12:10:42 PM
Test Completed On		
Result Summary		Skipped
Subsystem Communications Test		Skipped
Air Flow Test		Skipped
Water Flow Test		Skipped
Gas Flows Test		Skipped
RF Generator Test		Skipped
Camera Test		Skipped
Optics Test		Pass
Advanced Valve System Test		Skipped
Resolution Test		Pass
Sensitivity Test		Pass
Precision Test		Pass
Optics Test		Pass
Radial	Axial	
Intensity	5823476	
Wavelength	737.212	

Gas Flows Test		Pass
Nebulizer	Actual Flow	Actual Flow
Target Flow	0.70	1.99
		108.49
Makeup	Back Pressure	Back Pressure
Target Flow	2.00	17.91
		23.46
RF Generator Test		Pass
RF Power Supply Test	Passed	
RF Power Supply (V)	147.437	
RF Oscillator Test	Passed	
RF Oscillator Frequency (MHz)	0.000	
Work Coil Current (A)	45.069	
RF Power Supply Current (A)	1.997	
Camera Test		Pass
	Integration Time (ms)	Status
Electronic Offset Test	1000	Passed
Dark Current Test	6000	Passed
Array Test	5	Passed
Linearity Test	0.118	Passed

Sensitivity Test						Pass	
Radial							
Element Wavelength	Specification	Method	Ratio	Standard	Blank		
As (188.980 nm)	≥ 46.0	SRBR	147.8	1149.3	54.8		
Se (196.026 nm)	≥ 41.0	SRBR	111.6	1222.8	101.0		
Zn (213.857 nm)	≥ 1421.0	SRBR	4375.0	52592.3	143.7		
Pb (220.353 nm)	≥ 46.0	SRBR	199.8	2744.4	166.5		
Mn (257.610 nm)	≥ 3518.0	SRBR	12801.7	285591.3	496.0		
Al (396.152 nm)	≥ 3.4	SBR	9.9	52888.6	4873.6		
Ba (493.408 nm)	≥ 34.0	SBR	154.6	2287291.6	14698.1		
K (766.491 nm)	≥ 1.8	SBR	6.4	106701.6	14350.9		
Axial							
Element Wavelength	Specification	Method	Ratio	Standard	Blank		
As (188.980 nm)	≥ 208.0	SRBR	242.4	3170.1	154.8		
Se (196.026 nm)	≥ 159.0	SRBR	226.1	4134.5	289.3		
Zn (206.200 nm)	≥ 234.0	SRBR	1126.6	13782.0	146.5		
Zn (213.857 nm)	≥ 1743.0	SRBR	8400.8	177166.3	442.5		
Cd (214.439 nm)	≥ 4227.0	SRBR	7001.9	125884.2	321.6		
Pb (220.353 nm)	≥ 320.0	SRBR	536.3	12909.3	532.6		
Mn (257.610 nm)	≥ 10625.0	SRBR	30846.2	1287989.0	1738.8		
Cr (267.716 nm)	≥ 1048.0	SRBR	4396.0	167335.6	1424.4		
Cu (324.754 nm)	≥ 19.0	SBR	52.1	373690.7	7033.1		
Al (396.152 nm)	≥ 6.0	SBR	16.8	268357.7	15112.4		
Ba (493.408 nm)	≥ 60.0	SBR	225.2	10173441.5	44971.7		
K (766.491 nm)	≥ 24.0	SBR	39.7	1874136.2	46055.7		

Resolution Test			Pass
Element Wavelength	Specification	Width	
N (174.213 nm)	≤ 9.40	6.79	
As (188.980 nm)	≤ 8.20	6.09	
C (193.027 nm)	≤ 11.50	8.29	
Mo (202.032 nm)	≤ 8.20	6.30	
Cr (206.158 nm)	≤ 13.40	9.05	
Zn (213.857 nm)	≤ 8.70	6.77	
Pb (220.353 nm)	≤ 9.50	7.02	
Co (228.615 nm)	≤ 17.20	11.67	
Ba (230.424 nm)	≤ 9.40	7.39	
Mn (257.610 nm)	≤ 13.30	9.48	
Mn (260.568 nm)	≤ 20.30	14.25	
Cr (267.716 nm)	≤ 11.00	7.94	
Cu (324.754 nm)	≤ 25.00	18.99	
Cu (327.395 nm)	≤ 14.20	11.33	
Sr (338.071 nm)	≤ 33.50	24.44	
Ba (455.403 nm)	≤ 44.00	33.86	
Sr (460.733 nm)	≤ 36.00	17.51	
Ba (493.408 nm)	≤ 36.00	25.56	
Ba (614.171 nm)	≤ 42.00	24.96	
Ar (675.283 nm)	≤ 74.00	59.38	
K (766.491 nm)	≤ 80.00	65.63	

Pass

Precision Test

Radial

Element Wavelength	Specification	Measured Value % RSD
As (188.980 nm)	≤ 2.60	0.60
Se (196.026 nm)	≤ 2.60	0.84
Zn (213.857 nm)	≤ 1.50	0.29
Pb (220.353 nm)	≤ 2.60	0.59
Mn (257.610 nm)	≤ 1.50	0.28
Al (396.152 nm)	≤ 1.50	0.28
Ba (493.408 nm)	≤ 1.50	0.59
K (766.491 nm)	≤ 1.50	0.23

Axial

Element Wavelength	Specification	Measured Value % RSD
As (188.980 nm)	≤ 1.50	0.71
Se (196.026 nm)	≤ 1.50	0.43
Zn (206.200 nm)	≤ 1.50	0.46
Zn (213.857 nm)	≤ 1.50	0.37
Cd (214.439 nm)	≤ 1.50	0.48
Pb (220.353 nm)	≤ 1.50	0.48
Mn (257.610 nm)	≤ 1.50	0.74
Cr (267.716 nm)	≤ 1.50	0.26
Cu (324.754 nm)	≤ 1.50	0.51
Al (396.152 nm)	≤ 1.50	0.45
Ba (493.408 nm)	≤ 1.50	0.81
K (766.491 nm)	≤ 1.50	0.84