

คุณภาพน้ำใต้ดิน

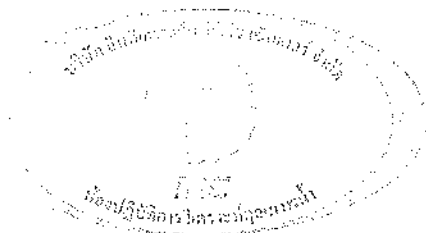
ตรวจวัดโดยบริษัท อินทิเกรทเต็ด รีเสิร์ช เซ็นเตอร์ จำกัด ร่วมกับ
บริษัท ยูไนเต็ด แอนนาลิสต์ แอนด์ เอ็นจิเนียริง คอนซัลแตนท์ จำกัด

รายงานผลการทดสอบคุณภาพน้ำ

รายงานเลขที่ : 2025/04/139
 ชื่อลูกค้า : บริษัท ดับเบิ้ล เอ (1991) จำกัด (มหาชน)
 ที่อยู่ : 1 หมู่ 2 ต. ท่าตูม อ. ศรีมหาโพธิ จ. ปราจีนบุรี 25140
 ตัวอย่างเลขที่ : 2025/04/139
 เวลาเก็บตัวอย่าง : 10.35 น.
 สถานที่เก็บตัวอย่าง : บ้านบยายใบ
 วิธีการเก็บตัวอย่าง : Grab
 วันที่เก็บตัวอย่าง : 1/4/2025
 วันที่รับตัวอย่าง : 1/4/2025
 วันที่วิเคราะห์ : 1-8/04/2025
 ชนิดตัวอย่าง : น้ำบาดาล

พารามิเตอร์ที่ทดสอบ	หน่วย	วิธีทดสอบ	ผลการทดสอบ	Standard*
pH	-	Electrometric Method	5.7	7.0 - 8.5
Total Dissolved Solids	mg/L	Dried at 180 °C	193	≤ 600
Cadmium	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.002	ต้องไม่มี
Copper	mg/L	Digestion, Inductively Coupled Plasma Method	0.013	≤ 1.0
Nickel	mg/L	Digestion, Inductively Coupled Plasma Method	0.004	-
Lead	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.010	ต้องไม่มี
Zinc	mg/L	Digestion, Inductively Coupled Plasma Method	2.395	≤ 5.0
Manganese	mg/L	Digestion, Inductively Coupled Plasma Method	0.037	≤ 0.3
Arsenic	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.006	ต้องไม่มี
Selenium	mg/L	Digestion, Inductively Coupled Plasma Method	0.006	ต้องไม่มี
Hexavalent Chromium	mg/L	Filtration, Colorimetric Method	0.131	-

ลักษณะตัวอย่าง : สีเหลือง ความขุ่นน้อย ตะกอนขนาดเล็ก แฉวนลอย ไม่มีกลิ่น
หมายเหตุ : วิเคราะห์ตามมาตรฐาน Standard Methods for the Examination of Water and Wastewater ,
 23rd Edition, 2017 ออกโดย APHA - AWWA - WEF.
 * ประกาศกระทรวงทรัพยากรธรรมชาติและสิ่งแวดล้อม พ.ศ.2551 มาตรฐานคุณภาพน้ำบาดาล
ผู้เก็บตัวอย่าง : นางสาวชนิกานต์ แสงสุข



อนุมัติโดย : ธีราภรณ์

(นางวีราภรณ์ ผลเจริญ)

Lab Manager

รายงานฉบับนี้รับรองเฉพาะตัวอย่างที่ได้ทำการทดสอบเท่านั้น ห้ามนำไปคัดลอกหรือรายงานผลเพียงบางส่วน โดยไม่ได้รับอนุญาตจากห้องปฏิบัติการเป็นลายลักษณ์อักษร

122 หมู่ 2 ต.ท่าตูม อ.ศรีมหาโพธิ จ.ปราจีนบุรี 25140 โทร 02-6345230 ต่อ 3311

ฉบับที่ : 1 (แก้ไขครั้งที่ 0)

หน้า 1 ของ 1

รายงานผลการทดสอบคุณภาพน้ำ

รายงานเลขที่ : 2025/04/140
 ชื่อลูกค้า : บริษัท ดับเบิล เอ (1991) จำกัด (มหาชน)
 ที่อยู่ : 1 หมู่ 2 ต. ท่าตูม อ. ศรีมหาโพธิ จ. ปราจีนบุรี 25140
 ตัวอย่างเลขที่ : 2025/04/140
 วันที่เก็บตัวอย่าง : 1/4/2025
 เวลาเก็บตัวอย่าง : 16.32 น.
 วันที่รับตัวอย่าง : 1/4/2025
 สถานที่เก็บตัวอย่าง : บ้านโป่งไผ่
 วันที่วิเคราะห์ : 1-8/04/2025
 วิธีการเก็บตัวอย่าง : Grab
 ชนิดตัวอย่าง : น้ำบาดาล

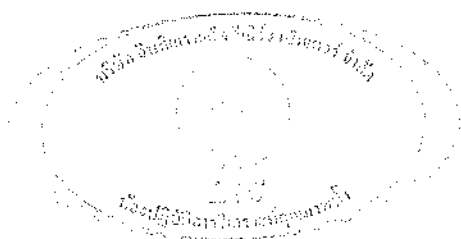
พารามิเตอร์ที่ทดสอบ	หน่วย	วิธีทดสอบ	ผลการทดสอบ	Standard*
pH	-	Electrometric Method	7.1	7.0 - 8.5
Total Dissolved Solids	mg/L	Dried at 180 °C	196	≤ 600
Cadmium	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.002	ต้องไม่มี
Copper	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.006	≤ 1.0
Nickel	mg/L	Digestion, Inductively Coupled Plasma Method	0.004	-
Lead	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.010	ต้องไม่มี
Zinc	mg/L	Digestion, Inductively Coupled Plasma Method	0.007	≤ 5.0
Manganese	mg/L	Digestion, Inductively Coupled Plasma Method	0.389	≤ 0.3
Arsenic	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.006	ต้องไม่มี
Selenium	mg/L	Digestion, Inductively Coupled Plasma Method	0.007	ต้องไม่มี
Hexavalent Chromium	mg/L	Filtration, Colorimetric Method	< 0.025	-

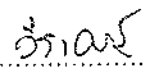
ลักษณะตัวอย่าง : ไม่มีสี ไม่มีกลิ่น

หมายเหตุ : วิธีวิเคราะห์ตามมาตรฐาน Standard Methods for the Examination of Water and Wastewater ,
 23rd Edition, 2017 ออกโดย APHA - AWWA - WEF.

: * ประกาศกระทรวงทรัพยากรธรรมชาติและสิ่งแวดล้อม พ.ศ.2551 มาตรฐานคุณภาพน้ำบาดาล

ผู้เก็บตัวอย่าง : นางสาวชนิกานต์ แสนสุข



อนุมัติโดย : 

(นางวีราภรณ์ ผลเจริญ)

Lab Manager

รายงานฉบับนี้รับรองเฉพาะตัวอย่างที่ได้ทำการทดสอบเท่านั้น ห้ามนำไปคัดลอกหรือรายงานผลเพียงบางส่วน โดยไม่ได้รับอนุญาตจากห้องปฏิบัติการเป็นลายลักษณ์อักษร

รายงานผลการทดสอบคุณภาพน้ำ

รายงานเลขที่ : 2025/04/141
 ชื่อลูกค้า : บริษัท ดับเบิล เอ (1991) จำกัด (มหาชน)
 ที่อยู่ : 1 หมู่ 2 ต. ท่าตูม อ. ศรีมหาโพธิ จ. ปราจีนบุรี 25140
 ตัวอย่างเลขที่ : 2025/04/141
 วันที่เก็บตัวอย่าง : 1/4/2025
 เวลาเก็บตัวอย่าง : 11.52 น.
 วันที่รับตัวอย่าง : 1/4/2025
 สถานที่เก็บตัวอย่าง : บ้านหัวโล่
 วันที่วิเคราะห์ : 1-8/04/2025
 วิธีการเก็บตัวอย่าง : Grab
 ชนิดตัวอย่าง : น้ำบาดาล

พารามิเตอร์ที่ทดสอบ	หน่วย	วิธีทดสอบ	ผลการทดสอบ	Standard*
pH	-	Electrometric Method	6.1	7.0 - 8.5
Total Dissolved Solids	mg/L	Dried at 180 °C	32	≤ 600
Cadmium	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.002	ต้องไม่มี
Copper	mg/L	Digestion, Inductively Coupled Plasma Method	0.006	≤ 1.0
Nickel	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.004	-
Lead	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.010	ต้องไม่มี
Zinc	mg/L	Digestion, Inductively Coupled Plasma Method	0.005	≤ 5.0
Manganese	mg/L	Digestion, Inductively Coupled Plasma Method	0.006	≤ 0.3
Arsenic	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.006	ต้องไม่มี
Selenium	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.006	ต้องไม่มี
Hexavalent Chromium	mg/L	Filtration, Colorimetric Method	< 0.025	-

ลักษณะตัวอย่าง : ไม่มีสี ไม่มีกลิ่น

หมายเหตุ : วิเคราะห์ตามมาตรฐาน Standard Methods for the Examination of Water and Wastewater ,
 23rd Edition, 2017 ออกโดย APHA - AWWA - WEF.

* ประกาศกระทรวงทรัพยากรธรรมชาติและสิ่งแวดล้อม พ.ศ.2551 มาตรฐานคุณภาพน้ำบาดาล

ผู้เก็บตัวอย่าง : นางสาวชนิกานต์ แสงสุข



อนุมัติโดย : วิภากร

(นางวิภากรณ์ ผลเจริญ)

Lab Manager

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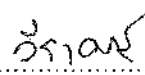
รายงานผลการทดสอบคุณภาพน้ำ

รายงานเลขที่ : 2025/04/142
 ชื่อลูกค้า : บริษัท ดับเบิล เอ (1991) จำกัด (มหาชน)
 ที่อยู่ : 1 หมู่ 2 ต. ท่าตูม อ. ศรีมหาโพธิ จ. ปราจีนบุรี 25140
 ตัวอย่างเลขที่ : 2025/04/142
 วันที่เก็บตัวอย่าง : 1/4/2025
 เวลาเก็บตัวอย่าง : 15.55 น.
 วันที่รับตัวอย่าง : 1/4/2025
 สถานที่เก็บตัวอย่าง : บ้านหนองตะโก
 วันที่วิเคราะห์ : 1-8/04/2025
 วิธีการเก็บตัวอย่าง : Grab
 ชนิดตัวอย่าง : น้ำบาดาล

พารามิเตอร์ที่ทดสอบ	หน่วย	วิธีทดสอบ	ผลการทดสอบ	Standard*
pH	-	Electrometric Method	6.8	7.0 - 8.5
Total Dissolved Solids	mg/L	Dried at 180 °C	165	≤ 600
Cadmium	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.002	ต้องไม่มี
Copper	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.006	≤ 1.0
Nickel	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.004	-
Lead	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.010	ต้องไม่มี
Zinc	mg/L	Digestion, Inductively Coupled Plasma Method	0.006	≤ 5.0
Manganese	mg/L	Digestion, Inductively Coupled Plasma Method	0.082	≤ 0.3
Arsenic	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.006	ต้องไม่มี
Selenium	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.006	ต้องไม่มี
Hexavalent Chromium	mg/L	Filtration, Colorimetric Method	< 0.025	-

ลักษณะตัวอย่าง : ไม่มีสี ความขุ่นน้อย ตะกอนขนาดเล็ก แว่นลอย ไม่มีกลิ่น
หมายเหตุ : วิเคราะห์ตามมาตรฐาน Standard Methods for the Examination of Water and Wastewater ,
 23rd Edition, 2017 ออกโดย APHA - AWWA - WEF.
 : * ประกาศกระทรวงทรัพยากรธรรมชาติและสิ่งแวดล้อม พ.ศ.2551 มาตรฐานคุณภาพน้ำบาดาล
ผู้เก็บตัวอย่าง : นางสาวชนิกานต์ แสนสุข



อนุมัติโดย : 

(นางวีราภรณ์ ผลเจริญ)

Lab Manager

รายงานฉบับนี้รับรองเฉพาะตัวอย่างที่ได้ทำการทดสอบเท่านั้น ห้ามนำไปตีตลาดหรือรายงานผลเพียงบางส่วน โดยไม่ได้รับอนุญาตจากห้องปฏิบัติการเป็นลายลักษณ์อักษร

122 หมู่ 2 ต.ท่าตูม อ.ศรีมหาโพธิ จ.ปราจีนบุรี 25140 โทร 02-6345230 ต่อ 3311

ฉบับที่ : 1 (แก้ไขครั้งที่ : 0)

หน้า 1 ของ 1

ANALYSIS REPORT

CUSTOMER NAME : DOUBLE A (1991) PUBLIC CO.,LTD (PULP 1)
ADDRESS : 1 MOO 2 THA TUM SI MAHA PHOT PRACHIN BURI 25140
CONTACT INFORMATION : TEL : 08 5835 1371 e-mail : kunnapat_p@doublea1991.com
SAMPLING SOURCE : น้ำบาดาล
SAMPLE TYPE : GROUNDWATER
SAMPLING DATE : APRIL 1, 2025
SAMPLING TIME : 10:35 HOUR
SAMPLING METHOD ° : GRAB, GRAB AND STERILE TECHNIQUE
SAMPLING BY ° : MR KRIDSANAPONG NAMTHIP
ANALYZED BY : MISS KEWALEE SUKHAREE
RECEIVED DATE : APRIL 2, 2025
ANALYTICAL DATE : APRIL 2-12, 2025
ISSUE DATE : APRIL 23, 2025
REPORT NO. : 2025-U034370
WORK NO. : 2024-009408
ANALYSIS NO. : T25AH169-0001

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT	LIMIT OF QUANTITATION (LOQ)
			บ้านนาบอน T25AH169-0001			
COLOUR ^c	Pl-Co	VISUAL COMPARISON METHOD (SM: PART 2120 B)	< 5	≤ 15	-	5
TURBIDITY ^c	NTU	NEPHELOMETRIC METHOD (SM: PART 2130 B)	140	≤ 20	-	0.5
TOTAL SOLIDS ^c	mg/L	TOTAL SOLIDS DRIED AT 103-105 °C (SM: PART 2540 B)	268	-	25	-
TOTAL HARDNESS ^a	mg/L as CaCO ₃	EDTA TITRIMETRIC METHOD (SM: PART 2340 C)	113	≤ 500	1.0	4.0
CHLORIDE ^a	mg/L Cl ⁻	ARGENTOMETRIC METHOD (SM: 4500-Cl ⁻ B)	38.4	≤ 600	0.5	2.0
FLUORIDE ^c	mg/L F ⁻	SPADNS METHOD (SM: PART 4500-F D)	0.13	≤ 1.0	0.02	0.08
SULPHATE ^c	mg/L SO ₄ ²⁻	TURBIDIMETRIC METHOD (SM: PART 4500-SO ₄ ²⁻ E)	< 4.0	≤ 250	1.0	4.0
NON-CARBONATE HARDNESS ^c	mg/L as CaCO ₃	TITRATION, EDTA TITRIMETRIC (SM: PART 2320 B AND PART 2340 C) AND CALCULATION METHOD	0	≤ 250	-	-
METALS						
MERCURY ^b	mg/L Hg	IN-HOUSE METHOD: UAE.TP.HEM.002 BASED ON SM: PART 3112 B	ND	≤ 0.001	0.0001	0.0005
MAGNESIUM ^c	mg/L Mg	NITRIC ACID-HYDROCHLORIC ACID DIGESTION AND INDUCTIVELY COUPLED PLASMA (ICP) METHOD (SM: PART 3030 F AND PART 3120 B)	8.51	-	0.005	-
IRON ^a	mg/L Fe	UAE.TP.HEM.003 BASED ON SM: PART 3030 E AND PART 3111 B	11.5	≤ 1.0	0.005	0.050



PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT	LIMIT OF QUANTITATION (LOQ)
			มาตรฐานไทย T25AH169-0001			
MICROBIOLOGY						
TOTAL COLIFORM BACTERIA ^b	MPN/100 mL	MULTIPLE-TUBE FERMENTATION TECHNIQUE (SM: PART 9221 B AND C)	49	< 2.2 (1)	1.8	-
FAECAL COLIFORM BACTERIA ^b	MPN/100 mL	MULTIPLE-TUBE FERMENTATION TECHNIQUE (SM: PART 9221 B, C AND E)	49	-	1.8	-
<i>E. coli</i> ^b	MPN/100 mL	MULTIPLE-TUBE FERMENTATION TECHNIQUE (SM: PART 9221 B, C, E AND F)	4.0	NONE	1.8	-
SAMPLE CONDITION						
WATER'S COLOUR/TURBID SEDIMENT			YELLOW/TURBID BROWN			

^a : ISO/IEC 17025 ACCREDITED BY THAI INDUSTRIAL STANDARDS INSTITUTE (TISI)

^b : ISO/IEC 17025 ACCREDITED BY DEPARTMENT OF SCIENCE SERVICE (DSS)

^c : VERIFIED BY OWN LABORATORY QUALITY SYSTEM, BUT NOT IN SCOPE OF ACCREDITATION

SM : STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 24th EDITION, 2023.

REGULATORY STANDARD : GROUNDWATER QUALITY STANDRAD FOR DRINKING PURPOSES SET BY NOTIFICATION OF MINISTRY OF NATURAL RESOURCES AND ENVIRONMENT B.E.2551, MAXIMUM ALLOWABLE., (1) SUITABLE ALLOWANCE.

ND : NOT DETECTED.

Bhuchonk Panichlertumpi

(MR BHUCHONK PANICHLERTUMPI)
LABORATORY SUPERVISOR

ANALYSIS REPORT

CUSTOMER NAME : DOUBLE A (1991) PUBLIC CO.,LTD (PULP 1)
ADDRESS : 1 MOO 2 THA TUM SI MAHA PHOT PRACHIN BURI 25140
CONTACT INFORMATION : TEL : 08 5835 1371 e-mail : kunnapat_p@doublea1991.com
SAMPLING SOURCE : บ้านหนองตะโก
SAMPLE TYPE : GROUNDWATER
SAMPLING DATE : APRIL 1, 2025
SAMPLING TIME : 15:55 HOUR
SAMPLING METHOD ° : GRAB, GRAB AND STERILE TECHNIQUE
SAMPLING BY ° : MR KRIDSANAPONG NAMTHIP
ANALYZED BY : MISS KEWALEE SUKHAREE

RECEIVED DATE : APRIL 2, 2025
ANALYTICAL DATE : APRIL 2-12, 2025
ISSUE DATE : APRIL 23, 2025
REPORT NO. : 2025-U034371
WORK NO. : 2024-009408
ANALYSIS NO. : T25AH169-0003

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT	LIMIT OF QUANTITATION (LOQ)
			บ้านหนองตะโก T25AH169-0003			
COLOUR ^c	Pt-Co	VISUAL COMPARISON METHOD (SM: PART 2120 B)	< 5	≤ 15	-	5
TURBIDITY ^c	NTU	NEPHELOMETRIC METHOD (SM: PART 2130 B)	6.2	≤ 20	-	0.5
TOTAL SOLIDS ^c	mg/L	TOTAL SOLIDS DRIED AT 103-105 °C (SM: PART 2540 B)	229	-	25	-
TOTAL HARDNESS ^a	mg/L as CaCO ₃	EDTA TITRIMETRIC METHOD (SM: PART 2340 C)	153	≤ 500	1.0	4.0
CHLORIDE ^a	mg/L Cl ⁻	ARGENTOMETRIC METHOD (SM: 4500-Cl ⁻ B)	10.8	≤ 600	0.5	2.0
FLUORIDE ^c	mg/L F ⁻	SPADNS METHOD (SM: PART 4500-F D)	0.15	≤ 1.0	0.02	0.08
SULPHATE ^c	mg/L SO ₄ ²⁻	TURBIDIMETRIC METHOD (SM: PART 4500-SO ₄ ²⁻ E)	< 4.0	≤ 250	1.0	4.0
NON-CARBONATE HARDNESS ^c	mg/L as CaCO ₃	TITRATION, EDTA TITRIMETRIC (SM: PART 2320 B AND PART 2340 C) AND CALCULATION METHOD	0	≤ 250	-	-
METALS						
MERCURY ^b	mg/L Hg	IN-HOUSE METHOD: UAE.TP.HEM.002 BASED ON SM: PART 3112 B	ND	≤ 0.001	0.0001	0.0005
MAGNESIUM ^c	mg/L Mg	NITRIC ACID-HYDROCHLORIC ACID DIGESTION AND INDUCTIVELY COUPLED PLASMA (ICP) METHOD (SM: PART 3030 F AND PART 3120 B)	12.4	-	0.005	-
IRON ^a	mg/L Fe	UAE.TP.HEM.003 BASED ON SM: PART 3030 E AND PART 3111 B	0.419	≤ 1.0	0.005	0.050



PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT	LIMIT OF QUANTITATION (LOQ)
			บ้านหนองตะโก T25AH169-0003			
MICROBIOLOGY						
TOTAL COLIFORM BACTERIA ^b	MPN/100 mL	MULTIPLE-TUBE FERMENTATION TECHNIQUE (SM: PART 9221 B AND C)	4.0	< 2.2 (1)	1.8	-
FAECAL COLIFORM BACTERIA ^b	MPN/100 mL	MULTIPLE-TUBE FERMENTATION TECHNIQUE (SM: PART 9221 B, C AND E)	2.0	-	1.8	-
<i>E. coli</i> ^b	MPN/100 mL	MULTIPLE-TUBE FERMENTATION TECHNIQUE (SM: PART 9221 B, C, E AND F)	< 1.8	NONE	1.8	-
SAMPLE CONDITION						
WATER'S COLOUR/TURBID SEDIMENT			YELLOW/CLEAR BROWN			

^a : ISO/IEC 17025 ACCREDITED BY THAI INDUSTRIAL STANDARDS INSTITUTE (TISI)

^b : ISO/IEC 17025 ACCREDITED BY DEPARTMENT OF SCIENCE SERVICE (DSS)

^c : VERIFIED BY OWN LABORATORY QUALITY SYSTEM, BUT NOT IN SCOPE OF ACCREDITATION

SM : STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 24th EDITION, 2023.

REGULATORY STANDARD : GROUNDWATER QUALITY STANDRAD FOR DRINKING PURPOSES SET BY NOTIFICATION OF MINISTRY OF NATURAL RESOURCES AND ENVIRONMENT B.E.2551, MAXIMUM ALLOWABLE., (1) SUITABLE ALLOWANCE.

ND : NOT DETECTED.

Bhuchonk Panichlertumpi

(MR BHUCHONK PANICHLERTUMPI)
LABORATORY SUPERVISOR

ANALYSIS REPORT

CUSTOMER NAME : DOUBLE A (1991) PUBLIC CO.,LTD (PULP 1)
ADDRESS : 1 MOO 2 THA TUM SI MAHA PHOT PRACHIN BURI 25140
CONTACT INFORMATION : TEL : 08 5835 1371 e-mail : kunnapat_p@doublea1991.com
SAMPLING SOURCE : น้ำในบึงไผ่
SAMPLE TYPE : GROUNDWATER
SAMPLING DATE : APRIL 1, 2025
SAMPLING TIME : 16:32 HOUR
SAMPLING METHOD ° : GRAB, GRAB AND STERILE TECHNIQUE
SAMPLING BY ° : MR KRIDSANAPONG NAMTHIP
ANALYZED BY : MISS KEWALEE SUKHAREE

RECEIVED DATE : APRIL 2, 2025
ANALYTICAL DATE : APRIL 2-12, 2025
ISSUE DATE : APRIL 23, 2025
REPORT NO. : 2025-U034372
WORK NO. : 2024-009408
ANALYSIS NO. : T25AH169-0005

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT	LIMIT OF QUANTITATION (LOQ)
			บ้านโพธิ์ไผ่ T25AH169-0005			
COLOUR ^c	Pl-Co	VISUAL COMPARISON METHOD (SM: PART 2120 B)	< 5	≤ 15	-	5
TURBIDITY ^c	NTU	NEPHELOMETRIC METHOD (SM: PART 2130 B)	6.0	≤ 20	-	0.5
TOTAL SOLIDS ^c	mg/L	TOTAL SOLIDS DRIED AT 103-105 °C (SM: PART 2540 B)	300	-	25	-
TOTAL HARDNESS ^a	mg/L as CaCO ₃	EDTA TITRIMETRIC METHOD (SM: PART 2340 C)	173	≤ 500	1.0	4.0
CHLORIDE ^b	mg/L Cl ⁻	ARGENTOMETRIC METHOD (SM: 4500-Cl ⁻ B)	23.7	≤ 600	0.5	2.0
FLUORIDE ^c	mg/L F ⁻	SPADNS METHOD (SM: PART 4500-F D)	0.14	≤ 1.0	0.02	0.08
SULPHATE ^c	mg/L SO ₄ ²⁻	TURBIDIMETRIC METHOD (SM: PART 4500-SO ₄ ²⁻ E)	< 4.0	≤ 250	1.0	4.0
NON-CARBONATE HARDNESS ^c	mg/L as CaCO ₃	TITRATION, EDTA TITRIMETRIC (SM: PART 2320 B AND PART 2340 C) AND CALCULATION METHOD	0	≤ 250	-	-
METALS						
MERCURY ^b	mg/L Hg	IN-HOUSE METHOD: UAE.TP.HEM.002 BASED ON SM: PART 3112 B	ND	≤ 0.001	0.0001	0.0005
MAGNESIUM ^c	mg/L Mg	NITRIC ACID-HYDROCHLORIC ACID DIGESTION AND INDUCTIVELY COUPLED PLASMA (ICP) METHOD (SM: PART 3030 F AND PART 3120 B)	9.36	-	0.005	-
IRON ^a	mg/L Fe	UAE.TP.HEM.003 BASED ON SM: PART 3030 E AND PART 3111 B	1.25	≤ 1.0	0.005	0.050



PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT	LIMIT OF QUANTITATION (LOQ)
			น้ำมันปิ้งไฟ T25AH169-0005			
MICROBIOLOGY						
TOTAL COLIFORM BACTERIA ^b	MPN/100 mL	MULTIPLE-TUBE FERMENTATION TECHNIQUE (SM: PART 9221 B AND C)	24,000	< 2.2 (1)	1.8	-
FAECAL COLIFORM BACTERIA ^b	MPN/100 mL	MULTIPLE-TUBE FERMENTATION TECHNIQUE (SM: PART 9221 B, C AND E)	2,700	-	1.8	-
<i>E. coli</i> ^b	MPN/100 mL	MULTIPLE-TUBE FERMENTATION TECHNIQUE (SM: PART 9221 B, C, E AND F)	1.8	NONE	1.8	-
SAMPLE CONDITION						
WATER'S COLOUR/TURBID			YELLOW/CLEAR			
SEDIMENT			BROWN			

^a : ISO/IEC 17025 ACCREDITED BY THAI INDUSTRIAL STANDARDS INSTITUTE (TISI)

^b : ISO/IEC 17025 ACCREDITED BY DEPARTMENT OF SCIENCE SERVICE (DSS)

^c : VERIFIED BY OWN LABORATORY QUALITY SYSTEM, BUT NOT IN SCOPE OF ACCREDITATION

SM : STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 24th EDITION, 2023.

REGULATORY STANDARD : GROUNDWATER QUALITY STANDRAD FOR DRINKING PURPOSES SET BY NOTIFICATION OF MINISTRY OF NATURAL RESOURCES AND ENVIRONMENT B.E.2551, MAXIMUM ALLOWABLE., (1) SUITABLE ALLOWANCE.

ND : NOT DETECTED.

Bhuchonk p.

(MR BHUCHONK PANICHLERTUMPI)
LABORATORY SUPERVISOR

ANALYSIS REPORT

CUSTOMER NAME : DOUBLE A (1991) PUBLIC CO.,LTD (PULP 1)
ADDRESS : 1 MOO 2 THA TUM SI MAHA PHOT PRACHIN BURI 25140
CONTACT INFORMATION : TEL : 08 5835 1371 e-mail : kunnapat_p@doublea1991.com
SAMPLING SOURCE : บ้านหัวโล่
SAMPLE TYPE : GROUNDWATER
SAMPLING DATE : APRIL 1, 2025
SAMPLING TIME : 11:52 HOUR
SAMPLING METHOD ° : GRAB, GRAB AND STERILE TECHNIQUE
SAMPLING BY ° : MR KRIDSANAPONG NAMTHIP
ANALYZED BY : MISS KEWALEE SUKHAREE

RECEIVED DATE : APRIL 2, 2025
ANALYTICAL DATE : APRIL 2-12, 2025
ISSUE DATE : APRIL 23, 2025
REPORT NO. : 2025-U034373
WORK NO. : 2024-009408
ANALYSIS NO. : T25AH169-0006

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT	LIMIT OF QUANTITATION (LOQ)
			บ้านหัวโล่ T25AH169-0006			
COLOUR ^c	Pt-Co	VISUAL COMPARISON METHOD (SM: PART 2120 B)	< 5	≤ 15	-	5
TURBIDITY ^c	NTU	NEPHELOMETRIC METHOD (SM: PART 2130 B)	< 0.5	≤ 20	-	0.5
TOTAL SOLIDS ^c	mg/L	TOTAL SOLIDS DRIED AT 103-105 °C (SM: PART 2540 B)	43	-	25	-
TOTAL HARDNESS ^a	mg/L as CaCO ₃	EDTA TITRIMETRIC METHOD (SM: PART 2340 C)	5.5	≤ 500	1.0	4.0
CHLORIDE ^a	mg/L Cl ⁻	ARGENTOMETRIC METHOD (SM: 4500-Cl ⁻ B)	8.4	≤ 600	0.5	2.0
FLUORIDE ^c	mg/L F ⁻	SPADNS METHOD (SM: PART 4500-F D)	< 0.08	≤ 1.0	0.02	0.08
SULPHATE ^c	mg/L SO ₄ ²⁻	TURBIDIMETRIC METHOD (SM: PART 4500-SO ₄ ²⁻ E)	< 4.0	≤ 250	1.0	4.0
NON-CARBONATE HARDNESS ^c	mg/L as CaCO ₃	TITRATION, EDTA TITRIMETRIC (SM: PART 2320 B AND PART 2340 C) AND CALCULATION METHOD	0	≤ 250	-	-
METALS						
MERCURY ^b	mg/L Hg	IN-HOUSE METHOD: UAE.TP.HEM.002 BASED ON SM: PART 3112 B	ND	≤ 0.001	0.0001	0.0005
MAGNESIUM ^c	mg/L Mg	NITRIC ACID-HYDROCHLORIC ACID DIGESTION AND INDUCTIVELY COUPLED PLASMA (ICP) METHOD (SM: PART 3030 F AND PART 3120 B)	0.474	-	0.005	-
IRON ^b	mg/L Fe	UAE.TP.HEM.003 BASED ON SM: PART 3030 E AND PART 3111 B	< LOQ	≤ 1.0	0.005	0.050



PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT	LIMIT OF QUANTITATION (LOQ)
			บ้านห้วยโล T25AH169-0006			
MICROBIOLOGY						
TOTAL COLIFORM BACTERIA ^a	MPN/100 mL	MULTIPLE-TUBE FERMENTATION TECHNIQUE (SM: PART 9221 B AND C)	46	< 2.2 (1)	1.8	-
FAECAL COLIFORM BACTERIA ^b	MPN/100 mL	MULTIPLE-TUBE FERMENTATION TECHNIQUE (SM: PART 9221 B, C AND E)	46	-	1.8	-
<i>E. coli</i> ^b	MPN/100 mL	MULTIPLE-TUBE FERMENTATION TECHNIQUE (SM: PART 9221 B, C, E AND F)	< 1.8	NONE	1.8	-
SAMPLE CONDITION						
WATER'S COLOUR/TURBID SEDIMENT			COLOURLESS/CLEAR			
			-			

^a : ISO/IEC 17025 ACCREDITED BY THAI INDUSTRIAL STANDARDS INSTITUTE (TISI)

^b : ISO/IEC 17025 ACCREDITED BY DEPARTMENT OF SCIENCE SERVICE (DSS)

^c : VERIFIED BY OWN LABORATORY QUALITY SYSTEM, BUT NOT IN SCOPE OF ACCREDITATION

SM : STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 24th EDITION, 2023.

REGULATORY STANDARD : GROUNDWATER QUALITY STANDRAD FOR DRINKING PURPOSES SET BY NOTIFICATION OF MINISTRY
OF NATURAL RESOURCES AND ENVIRONMENT B.E.2551, MAXIMUM ALLOWABLE., (1) SUITABLE ALLOWANCE.

ND : NOT DETECTED.

< LOQ : < LIMIT OF QUANTITATION (IRON ≥ 0.005 AND < 0.050 mg/L).

Bhuchonk p.

(MR BHUCHONK PANICHLERTUMPI)
LABORATORY SUPERVISOR

คุณภาพน้ำในบ่อน้ำสังเกตุการณ์

ตรวจวัดโดยบริษัท อินทิเกรทเต็ด รีเสิร์ช เซ็นเตอร์ จำกัด ร่วมกับ
บริษัท ยูไนเต็ด แอนนาลิสต์ แอนด์ เอ็นจิเนียริง คอนซัลแตนท์ จำกัด

รายงานผลการทดสอบคุณภาพน้ำ

รายงานเลขที่ : 2025/01/130
 ชื่อลูกค้า : บริษัท ดับเบิล เอ (1991) จำกัด (มหาชน)
 ที่อยู่ : 1 หมู่ 2 ต. ท่าตูม อ. ศรีมหาโพธิ จ. ปราจีนบุรี 25140
 ตัวอย่างเลขที่ : 2025/01/130
 เวลาเก็บตัวอย่าง : 13.54 น.
 สถานที่เก็บตัวอย่าง : Monitoring Well 1
 วิธีการเก็บตัวอย่าง : Grab
 วันที่เก็บตัวอย่าง : 7/1/2025
 วันที่รับตัวอย่าง : 7/1/2025
 วันที่วิเคราะห์ : 7-14/01/2025
 ชนิดตัวอย่าง : น้ำใต้ดิน

พารามิเตอร์ที่ทดสอบ	หน่วย	วิธีทดสอบ	ผลการทดสอบ	Standard*
Temperature	° C	Laboratory and Field Method	29.1	-
Total Suspended Solids	mg/L	Dried at 103-105 °C	143	-
Total Dissolved Solids	mg/L	Dried at 180 °C	1256	-
COD	mgO ₂ /L	Closed Reflux, Colorimetric Method	45	-
BOD	mg/L	5 -Day BOD Test, Azide Modification Method	0.3	-

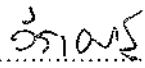
ลักษณะตัวอย่าง : สีเหลือง ความขุ่นมาก ตะกอนขนาดเล็ก แขนวลอย ไม่มีกลิ่น

หมายเหตุ : วิเคราะห์ตามมาตรฐาน Standard Methods for the Examination of Water and Wastewater , 23rd Edition, 2017 ออกโดย APHA - AWWA - WEF.

: * ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 20 พ.ศ. 2543 มาตรฐานคุณภาพน้ำใต้ดิน

ผู้เก็บตัวอย่าง : นางสาวชนิกานต์ แสนสุข



อนุมัติโดย : 

(นางวีราภรณ์ ผลเจริญ)

Lab Manager

รายงานฉบับนี้รับรองเฉพาะตัวอย่างที่ได้ทำการทดสอบเท่านั้น ห้ามนำไปคัดลอกหรือรายงานผลเพียงบางส่วน โดยไม่ได้รับอนุญาตจากห้องปฏิบัติการเป็นลายลักษณ์อักษร

รายงานผลการทดสอบคุณภาพน้ำ

รายงานเลขที่ : 2025/01/130
 ชื่อลูกค้า : บริษัท ดับเบิล เอ (1991) จำกัด (มหาชน)
 ที่อยู่ : 1 หมู่ 2 ต. ท่าตูม อ. ศรีมหาโพธิ จ. ปราจีนบุรี 25140
 ตัวอย่างเลขที่ : 2025/01/130
 เวลาเก็บตัวอย่าง : 13.54 น.
 สถานที่เก็บตัวอย่าง : Monitoring Well 1
 วิธีการเก็บตัวอย่าง : Grab

วันที่เก็บตัวอย่าง : 7/1/2025
 วันที่รับตัวอย่าง : 7/1/2025
 วันที่วิเคราะห์ : 7-14/01/2025
 ชนิดตัวอย่าง : น้ำใต้ดิน

พารามิเตอร์ที่ทดสอบ	หน่วย	วิธีทดสอบ	ผลการทดสอบ	Standard*
pH	-	Electrometric Method	6.1	-
Cadmium	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.002	≤ 0.003
Copper	mg/L	Digestion, Inductively Coupled Plasma Method	0.018	≤ 1.0
Nickel	mg/L	Digestion, Inductively Coupled Plasma Method	0.026	≤ 0.02
Lead	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.010	≤ 0.01
Zinc	mg/L	Digestion, Inductively Coupled Plasma Method	0.013	≤ 5.0
Manganese	mg/L	Digestion, Inductively Coupled Plasma Method	1.435	≤ 0.5
Arsenic	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.006	≤ 0.01
Hexavalent Chromium	mg/L	Filtration, Colorimetric Method	< 0.025	≤ 0.05

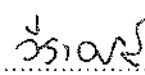
ลักษณะตัวอย่าง : สีเหลือง ความขุ่นมาก ตะกอนขนาดเล็ก แว่นลอย ไม่มีกลิ่น

หมายเหตุ : วิธีวิเคราะห์ตามมาตรฐาน Standard Methods for the Examination of Water and Wastewater ,
 23rd Edition, 2017 ออกโดย APHA - AWWA - WEF.

* ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 20 พ.ศ. 2543 มาตรฐานคุณภาพน้ำใต้ดิน

ผู้เก็บตัวอย่าง : นางสาวชนนิกานต์ แสนสุข (ว-199-จ-0007)



อนุมัติโดย : 

(นางวีราภรณ์ ผลเจริญ)

ว-199-ค-0003

รายงานฉบับนี้รับรองเฉพาะตัวอย่างที่ได้ทำการทดสอบเท่านั้น ห้ามนำไปคัดลอกหรือรายงานผลเพียงบางส่วน โดยไม่ได้รับอนุญาตจากห้องปฏิบัติการเป็นลายลักษณ์อักษร

122 หมู่ 2 ต.ท่าตูม อ.ศรีมหาโพธิ จ.ปราจีนบุรี 25140 โทร 02-6345230 ต่อ 3311

ฉบับที่ : 1 (แก้ไขครั้งที่ : 0)

หน้า 2 ของ 2

รายงานผลการทดสอบคุณภาพน้ำ

รายงานเลขที่ : 2025/01/131
 ชื่อลูกค้า : บริษัท ดับเบิ้ล เอ (1991) จำกัด (มหาชน)
 ที่อยู่ : 1 หมู่ 2 ต. ท่าตูม อ. ศรีมหาโพธิ จ. ปราจีนบุรี 25140
 ตัวอย่างเลขที่ : 2025/01/131
 วันที่เก็บตัวอย่าง : 7/1/2025
 เวลาเก็บตัวอย่าง : 14.07 น.
 วันที่รับตัวอย่าง : 7/1/2025
 สถานที่เก็บตัวอย่าง : Monitoring Well 2
 วันที่วิเคราะห์ : 7-14/01/2025
 วิธีการเก็บตัวอย่าง : Grab
 ชนิดตัวอย่าง : น้ำใต้ดิน

พารามิเตอร์ที่ทดสอบ	หน่วย	วิธีทดสอบ	ผลการทดสอบ	Standard*
Temperature	° C	Laboratory and Field Method	29.1	-
Total Suspended Solids	mg/L	Dried at 103-105 °C	23	-
Total Dissolved Solids	mg/L	Dried at 180 °C	1215	-
COD	mgO ₂ /L	Closed Reflux, Colorimetric Method	14	-
BOD	mg/L	5 -Day BOD Test, Azide Modification Method	0.8	-

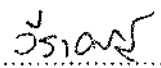
ลักษณะตัวอย่าง : สีเหลือง ความขุ่นปานกลาง ตะกอนขนาดเล็ก แขนงลอย ไม่มีกลิ่น

หมายเหตุ : วิเคราะห์ตามมาตรฐาน Standard Methods for the Examination of Water and Wastewater ,
23rd Edition, 2017 ออกโดย APHA - AWWA - WEF.

* ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 20 พ.ศ. 2543 มาตรฐานคุณภาพน้ำใต้ดิน

ผู้เก็บตัวอย่าง : นางสาวชนนิกานต์ แสงสุข



อนุมัติโดย : 

(นางวีราภรณ์ ผลเจริญ)

Lab Manager

รายงานฉบับนี้รับรองเฉพาะตัวอย่างที่ได้ทำการทดสอบเท่านั้น ห้ามนำไปคัดลอกหรือรายงานผลเพียงบางส่วน โดยไม่ได้รับอนุญาตจากห้องปฏิบัติการเป็นลายลักษณ์อักษร

รายงานผลการทดสอบคุณภาพน้ำ

รายงานเลขที่ : 2025/01/131
 ชื่อลูกค้า : บริษัท ดับเบิล เอ (1991) จำกัด (มหาชน)
 ที่อยู่ : 1 หมู่ 2 ต. ท่าตูม อ. ศรีมหาโพธิ จ. ปราจีนบุรี 25140
 ตัวอย่างเลขที่ : 2025/01/131
 เวลาเก็บตัวอย่าง : 14.07 น.
 สถานที่เก็บตัวอย่าง : Monitoring Well 2
 วิธีการเก็บตัวอย่าง : Grab
 วันที่เก็บตัวอย่าง : 7/1/2025
 วันที่รับตัวอย่าง : 7/1/2025
 วันที่วิเคราะห์ : 7-14/01/2025
 ชนิดตัวอย่าง : น้ำใต้ดิน

พารามิเตอร์ที่ทดสอบ	หน่วย	วิธีทดสอบ	ผลการทดสอบ	Standard*
pH	-	Electrometric Method	6.0	-
Cadmium	mg/L	Digestion,Inductively Coupled Plasma Method	< 0.002	≤ 0.003
Copper	mg/L	Digestion,Inductively Coupled Plasma Method	< 0.006	≤ 1.0
Nickel	mg/L	Digestion,Inductively Coupled Plasma Method	0.026	≤ 0.02
Lead	mg/L	Digestion,Inductively Coupled Plasma Method	< 0.010	≤ 0.01
Zinc	mg/L	Digestion,Inductively Coupled Plasma Method	< 0.004	≤ 5.0
Manganese	mg/L	Digestion,Inductively Coupled Plasma Method	0.149	≤ 0.5
Arsenic	mg/L	Digestion,Inductively Coupled Plasma Method	< 0.006	≤ 0.01
Hexavalent Chromium	mg/L	Filtration,Colorimetric Method	< 0.025	≤ 0.05

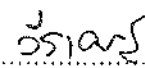
ลักษณะตัวอย่าง : สีเหลือง ความขุ่นปานกลาง ตะกอนขนาดเล็ก แว่นลอย ไม่มีกลิ่น

หมายเหตุ : วิเคราะห์ตามมาตรฐาน Standard Methods for the Examination of Water and Wastewater ,
23rd Edition,2017 ออกโดย APHA - AWWA - WEF.

: * ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 20 พ.ศ. 2543 มาตรฐานคุณภาพน้ำใต้ดิน

ผู้เก็บตัวอย่าง : นางสาวชนนิกานต์ แสนสุข (ว-199-จ-0007)



อนุมัติโดย : 

(นางวีราภรณ์ ผลเจริญ)

ว-199-ค-0003

รายงานฉบับนี้รับรองเฉพาะตัวอย่างที่ได้ทำการทดสอบเท่านั้น ห้ามนำไปคัดลอกหรือรายงานผลเพียงบางส่วน โดยไม่ได้รับอนุญาตจากห้องปฏิบัติการเป็นลายลักษณ์อักษร

รายงานผลการทดสอบคุณภาพน้ำ

รายงานเลขที่ : 2025/01/132
 ชื่อลูกค้า : บริษัท ดับเบิล เอ (1991) จำกัด (มหาชน)
 ที่อยู่ : 1 หมู่ 2 ต. ท่าตูม อ. ศรีมหาโพธิ จ. ปราจีนบุรี 25140
 ตัวอย่างเลขที่ : 2025/01/132
 เวลาเก็บตัวอย่าง : 13.33 น.
 สถานที่เก็บตัวอย่าง : Monitoring Well 3
 วิธีการเก็บตัวอย่าง : Grab
 วันที่เก็บตัวอย่าง : 7/1/2025
 วันที่รับตัวอย่าง : 7/1/2025
 วันที่วิเคราะห์ : 7-14/01/2025
 ชนิดตัวอย่าง : น้ำใต้ดิน

พารามิเตอร์ที่ทดสอบ	หน่วย	วิธีทดสอบ	ผลการทดสอบ	Standard*
Temperature	° C	Laboratory and Field Method	30.1	-
Total Suspended Solids	mg/L	Dried at 103-105 °C	37	-
Total Dissolved Solids	mg/L	Dried at 180 °C	1240	-
COD	mgO ₂ /L	Closed Reflux, Colorimetric Method	33	-
BOD	mg/L	5 -Day BOD Test, Azide Modification Method	1.7	-

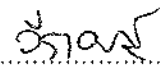
ลักษณะตัวอย่าง : สีเหลือง ความขุ่นปานกลาง ตะกอนขนาดเล็ก แฉว่นลอย ไม่มีกลิ่น

หมายเหตุ : วิเคราะห์ตามมาตรฐาน Standard Methods for the Examination of Water and Wastewater ,
23rd Edition, 2017 ออกโดย APHA - AWWA - WEF.

: * ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 20 พ.ศ. 2543 มาตรฐานคุณภาพน้ำใต้ดิน

ผู้เก็บตัวอย่าง : นางสาวชนิกานต์ แสนสุข



อนุมัติโดย : 

(นางวีราภรณ์ ผลเจริญ)

Lab Manager

รายงานฉบับนี้รับรองเฉพาะตัวอย่างที่ได้ทำการทดสอบเท่านั้น ห้ามนำไปคัดลอกหรือรายงานผลเพียงบางส่วน โดยไม่ได้รับอนุญาตจากห้องปฏิบัติการเป็นลายลักษณ์อักษร

รายงานผลการทดสอบคุณภาพน้ำ

รายงานเลขที่ : 2025/01/132
 ชื่อลูกค้า : บริษัท ดับเบิล เอ (1991) จำกัด (มหาชน)
 ที่อยู่ : 1 หมู่ 2 ต. ท่าตูม อ. ศรีมหาโพธิ จ. ปราจีนบุรี 25140
 ตัวอย่างเลขที่ : 2025/01/132
 เวลาเก็บตัวอย่าง : 13.33 น.
 สถานที่เก็บตัวอย่าง : Monitoring Well 3
 วิธีการเก็บตัวอย่าง : Grab

วันที่เก็บตัวอย่าง : 7/1/2025
 วันที่รับตัวอย่าง : 7/1/2025
 วันที่วิเคราะห์ : 7-14/01/2025
 ชนิดตัวอย่าง : น้ำใต้ดิน

พารามิเตอร์ที่ทดสอบ	หน่วย	วิธีทดสอบ	ผลการทดสอบ	Standard*
pH	-	Electrometric Method	6.5	-
Cadmium	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.002	≤ 0.003
Copper	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.006	≤ 1.0
Nickel	mg/L	Digestion, Inductively Coupled Plasma Method	0.023	≤ 0.02
Lead	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.010	≤ 0.01
Zinc	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.004	≤ 5.0
Manganese	mg/L	Digestion, Inductively Coupled Plasma Method	0.191	≤ 0.5
Arsenic	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.006	≤ 0.01
Hexavalent Chromium	mg/L	Filtration, Colorimetric Method	< 0.025	≤ 0.05

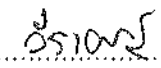
ลักษณะตัวอย่าง : สีเหลือง ความขุ่นปานกลาง ตะกอนขนาดเล็ก แขนงลอย ไม่มีกลิ่น

หมายเหตุ : วิเคราะห์ตามมาตรฐาน Standard Methods for the Examination of Water and Wastewater ,
 23rd Edition, 2017 ออกโดย APHA - AWWA - WEF.

: * ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 20 พ.ศ. 2543 มาตรฐานคุณภาพน้ำใต้ดิน

ผู้เก็บตัวอย่าง : นางสาวชนิกานต์ แสงสุข (ว-199-จ-0007)



อนุมัติโดย : 

(นางวิภาภรณ์ ผลเจริญ)

ว-199-ค-0003

รายงานฉบับนี้รับรองเฉพาะตัวอย่างที่ได้ทำการทดสอบเท่านั้น ห้ามนำไปคัดลอกหรือรายงานผลเพียงบางส่วน โดยไม่ได้รับอนุญาตจากห้องปฏิบัติการเป็นลายลักษณ์อักษร

รายงานผลการทดสอบคุณภาพน้ำ

รายงานเลขที่ : 2025/01/133

ชื่อลูกค้า : บริษัท ดับเบิล เอ (1991) จำกัด (มหาชน)

ที่อยู่ : 1 หมู่ 2 ต. ท่าตูม อ. ศรีมหาโพธิ จ. ปราจีนบุรี 25140

ตัวอย่างเลขที่ : 2025/01/133

วันที่เก็บตัวอย่าง : 7/1/2025

เวลาเก็บตัวอย่าง : 13.08 น.

วันที่รับตัวอย่าง : 7/1/2025

สถานที่เก็บตัวอย่าง : Monitoring Well 4

วันที่วิเคราะห์ : 7-14/01/2025

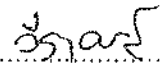
วิธีการเก็บตัวอย่าง : Grab

ชนิดตัวอย่าง : น้ำใต้ดิน

พารามิเตอร์ที่ทดสอบ	หน่วย	วิธีทดสอบ	ผลการทดสอบ	Standard*
Temperature	° C	Laboratory and Field Method	30.2	-
Total Suspended Solids	mg/L	Dried at 103-105 °C	201	-
Total Dissolved Solids	mg/L	Dried at 180 °C	1247	-
COD	mgO ₂ /L	Closed Reflux, Colorimetric Method	56	-
BOD	mg/L	5 -Day BOD Test, Azide Modification Method	2.2	-

ลักษณะตัวอย่าง : สีเหลือง ความขุ่นมาก ตะกอนขนาดเล็ก แฉวนลอย ไม่มีกลิ่นหมายเหตุ : วิเคราะห์ตามมาตรฐาน Standard Methods for the Examination of Water and Wastewater ,
23rd Edition, 2017 ออกโดย APHA - AWWA - WEF.

: * ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 20 พ.ศ. 2543 มาตรฐานคุณภาพน้ำใต้ดิน

ผู้เก็บตัวอย่าง : นางสาวชนนิกานต์ แสนสุขอนุมัติโดย : 

(นางวิภาภรณ์ ผลเจริญ)

Lab Manager

รายงานฉบับนี้รับรองเฉพาะตัวอย่างที่ได้ทำการทดสอบเท่านั้น ห้ามนำไปคัดลอกหรือรายงานผลเพียงบางส่วน โดยไม่ได้รับอนุญาตจากห้องปฏิบัติการเป็นลายลักษณ์อักษร

รายงานผลการทดสอบคุณภาพน้ำ

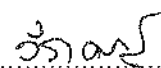
รายงานเลขที่ : 2025/01/133
 ชื่อลูกค้า : บริษัท ดับเบิล เอ (1991) จำกัด (มหาชน)
 ที่อยู่ : 1 หมู่ 2 ต. ท่าตูม อ. ศรีมหาโพธิ จ. ปราจีนบุรี 25140
 ตัวอย่างเลขที่ : 2025/01/133
 เวลาเก็บตัวอย่าง : 13.08 น.
 สถานที่เก็บตัวอย่าง : Monitoring Well 4
 วิธีการเก็บตัวอย่าง : Grab

วันที่เก็บตัวอย่าง : 7/1/2025
 วันที่รับตัวอย่าง : 7/1/2025
 วันที่วิเคราะห์ : 7-14/01/2025
 ชนิดตัวอย่าง : น้ำใต้ดิน

พารามิเตอร์ที่ทดสอบ	หน่วย	วิธีทดสอบ	ผลการทดสอบ	Standard*
pH	-	Electrometric Method	6.6	-
Cadmium	mg/L	Digestion,Inductively Coupled Plasma Method	< 0.002	≤ 0.003
Copper	mg/L	Digestion,Inductively Coupled Plasma Method	< 0.006	≤ 1.0
Nickel	mg/L	Digestion,Inductively Coupled Plasma Method	0.019	≤ 0.02
Lead	mg/L	Digestion,Inductively Coupled Plasma Method	< 0.010	≤ 0.01
Zinc	mg/L	Digestion,Inductively Coupled Plasma Method	< 0.004	≤ 5.0
Manganese	mg/L	Digestion,Inductively Coupled Plasma Method	0.367	≤ 0.5
Arsenic	mg/L	Digestion,Inductively Coupled Plasma Method	< 0.006	≤ 0.01
Hexavalent Chromium	mg/L	Filtration,Colorimetric Method	< 0.025	≤ 0.05

ลักษณะตัวอย่าง : สีเหลือง ความขุ่นมาก ตะกอนขนาดเล็ก แขวนลอย ไม่มีกลิ่น
หมายเหตุ : วิเคราะห์ตามมาตรฐาน Standard Methods for the Examination of Water and Wastewater ,
 23rd Edition,2017 ออกโดย APHA - AWWA - WEF.
 : * ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 20 พ.ศ. 2543 มาตรฐานคุณภาพน้ำใต้ดิน
ผู้เก็บตัวอย่าง : นางสาวชนนิกานต์ แสนสุข (ว-199-จ-0007)



อนุมัติโดย : 
 (นางวีราภรณ์ ผลเจริญ)
 ว-199-ค-0003

รายงานฉบับนี้รับรองเฉพาะตัวอย่างที่ได้ทำการทดสอบเท่านั้น ห้ามนำไปคัดลอกหรือรายงานผลเพียงบางส่วน โดยไม่ได้รับอนุญาตจากห้องปฏิบัติการเป็นลายลักษณ์อักษร

รายงานผลการทดสอบคุณภาพน้ำ

รายงานเลขที่ : 2025/02/129

ชื่อลูกค้า : บริษัท ดับเบิล เอ (1991) จำกัด (มหาชน)

ที่อยู่ : 1 หมู่ 2 ต. ท่าตูม อ. ศรีมหาโพธิ จ. ปราจีนบุรี 25140

ตัวอย่างเลขที่ : 2025/02/129

วันที่เก็บตัวอย่าง : 4/2/2025

เวลาเก็บตัวอย่าง : 14.13 น.

วันที่รับตัวอย่าง : 4/2/2025

สถานที่เก็บตัวอย่าง : Monitoring Well 1

วันที่วิเคราะห์ : 4-11/02/2025

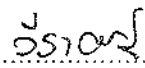
วิธีการเก็บตัวอย่าง : Grab

ชนิดตัวอย่าง : น้ำใต้ดิน

พารามิเตอร์ที่ทดสอบ	หน่วย	วิธีทดสอบ	ผลการทดสอบ	Standard*
Temperature	° C	Laboratory and Field Method	29.2	-
Total Suspended Solids	mg/L	Dried at 103-105 °C	22	-
Total Dissolved Solids	mg/L	Dried at 180 °C	1277	-
COD	mgO ₂ /L	Closed Reflux, Colorimetric Method	27	-
BOD	mg/L	5 -Day BOD Test, Azide Modification Method	0.3	-

ลักษณะตัวอย่าง : สีเหลือง ความขุ่นน้อย ตะกอนขนาดเล็ก แววนลอย ไม่มีกลิ่นหมายเหตุ : วิธีวิเคราะห์ตามมาตรฐาน Standard Methods for the Examination of Water and Wastewater ,
23rd Edition, 2017 ออกโดย APHA - AWWA - WEF.

: * ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 20 พ.ศ. 2543 มาตรฐานคุณภาพน้ำใต้ดิน

ผู้เก็บตัวอย่าง : นางสาวชนนิกันต์ แสนสุขอนุมัติโดย : 

(นางวีราภรณ์ ผลเจริญ)

Lab Manager

รายงานฉบับนี้รับรองเฉพาะตัวอย่างที่ได้ทำการทดสอบเท่านั้น ห้ามนำไปคัดลอกหรือรายงานผลเพียงบางส่วน โดยไม่ได้รับอนุญาตจากห้องปฏิบัติการเป็นลายลักษณ์อักษร

รายงานผลการทดสอบคุณภาพน้ำ

รายงานเลขที่ : 2025/02/129

ชื่อลูกค้า : บริษัท ดับเบิล เอ (1991) จำกัด (มหาชน)

ที่อยู่ : 1 หมู่ 2 ต. ท่าตูม อ. ศรีมหาโพธิ จ. ปราจีนบุรี 25140

ตัวอย่างเลขที่ : 2025/02/129

วันที่เก็บตัวอย่าง : 4/2/2025

เวลาเก็บตัวอย่าง : 14.13 น.

วันที่รับตัวอย่าง : 4/2/2025

สถานที่เก็บตัวอย่าง : Monitoring Well 1

วันที่วิเคราะห์ : 4-11/02/2025

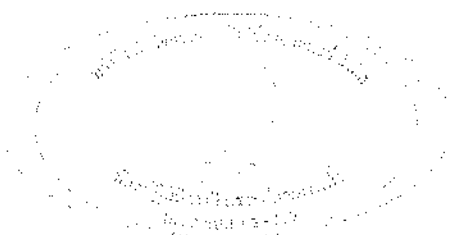
วิธีการเก็บตัวอย่าง : Grab

ชนิดตัวอย่าง : น้ำใต้ดิน

พารามิเตอร์ที่ทดสอบ	หน่วย	วิธีทดสอบ	ผลการทดสอบ	Standard*
pH	-	Electrometric Method	6.1	-
Cadmium	mg/L	Digestion,Inductively Coupled Plasma Method	< 0.002	≤ 0.003
Copper	mg/L	Digestion,Inductively Coupled Plasma Method	< 0.006	≤ 1.0
Nickel	mg/L	Digestion,Inductively Coupled Plasma Method	0.024	≤ 0.02
Lead	mg/L	Digestion,Inductively Coupled Plasma Method	< 0.010	≤ 0.01
Zinc	mg/L	Digestion,Inductively Coupled Plasma Method	< 0.004	≤ 5.0
Manganese	mg/L	Digestion,Inductively Coupled Plasma Method	1.458	≤ 0.5
Arsenic	mg/L	Digestion,Inductively Coupled Plasma Method	< 0.006	≤ 0.01
Hexavalent Chromium	mg/L	Filtration,Colorimetric Method	< 0.025	≤ 0.05

ลักษณะตัวอย่าง : สีเหลือง ความขุ่นน้อย ตะกอนขนาดเล็ก แขนวลอย ไม่มีกลิ่นหมายเหตุ : วิธีวิเคราะห์ตามมาตรฐาน Standard Methods for the Examination of Water and Wastewater ,
23rd Edition,2017 ออกโดย APHA - AWWA - WEF.

: * ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 20 พ.ศ. 2543 มาตรฐานคุณภาพน้ำใต้ดิน

ผู้เก็บตัวอย่าง : นางสาวชนิกานต์ แสนสุข (ว-199-จ-0007)อนุมัติโดย : วิภากร

(นางวิภากรณ์ ผลเจริญ)

ว-199-ค-0003

รายงานฉบับนี้รับรองเฉพาะตัวอย่างที่ได้ทำการทดสอบเท่านั้น ห้ามนำไปคัดลอกหรือรายงานผลเพียงบางส่วน โดยไม่ได้รับอนุญาตจากห้องปฏิบัติการเป็นลายลักษณ์อักษร

122 หมู่ 2 ต.ท่าตูม อ.ศรีมหาโพธิ จ.ปราจีนบุรี 25140 โทร 02-6345230 ต่อ 3311

ฉบับที่ : 1 (แก้ไขครั้งที่ : 0)

หน้า 2 ของ 2

รายงานผลการทดสอบคุณภาพน้ำ

รายงานเลขที่ : 2025/02/130
 ชื่อลูกค้า : บริษัท ดับเบิล เอ (1991) จำกัด (มหาชน)
 ที่อยู่ : 1 หมู่ 2 ต. ท่าตูม อ. ศรีมหาโพธิ จ. ปราจีนบุรี 25140
 ตัวอย่างเลขที่ : 2025/02/130
 เวลาเก็บตัวอย่าง : 14.21 น.
 สถานที่เก็บตัวอย่าง : Monitoring Well 2
 วิธีการเก็บตัวอย่าง : Grab

วันที่เก็บตัวอย่าง : 4/2/2025
 วันที่รับตัวอย่าง : 4/2/2025
 วันที่วิเคราะห์ : 4-11/02/2025
 ชนิดตัวอย่าง : น้ำใต้ดิน

พารามิเตอร์ที่ทดสอบ	หน่วย	วิธีทดสอบ	ผลการทดสอบ	Standard*
Temperature	° C	Laboratory and Field Method	29.7	-
Total Suspended Solids	mg/L	Dried at 103-105 °C	19	-
Total Dissolved Solids	mg/L	Dried at 180 °C	1270	-
COD	mgO ₂ /L	Closed Reflux, Colorimetric Method	32	-
BOD	mg/L	5 -Day BOD Test, Azide Modification Method	0.7	-

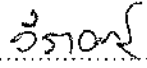
ลักษณะตัวอย่าง : สีเหลือง ความขุ่นน้อย ตะกอนขนาดเล็ก แขนวลอย ไม่มีกลิ่น

หมายเหตุ : วิธีวิเคราะห์ตามมาตรฐาน Standard Methods for the Examination of Water and Wastewater ,
 23rd Edition, 2017 ออกโดย APHA - AWWA - WEF.

* ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 20 พ.ศ. 2543 มาตรฐานคุณภาพน้ำใต้ดิน

ผู้เก็บตัวอย่าง : นางสาวชนิกานต์ แสงสุข



อนุมัติโดย : 

(นางวีราภรณ์ ผลเจริญ)

Lab Manager

รายงานฉบับนี้รับรองเฉพาะตัวอย่างที่ได้ทำการทดสอบเท่านั้น ห้ามนำไปคัดลอกหรือรายงานผลเพียงบางส่วน โดยไม่ได้รับอนุญาตจากห้องปฏิบัติการเป็นลายลักษณ์อักษร

122 หมู่ 2 ต.ท่าตูม อ.ศรีมหาโพธิ จ.ปราจีนบุรี 25140 โทร 02-6345230 ต่อ 3311

ฉบับที่ : 1 (แก้ไขครั้งที่ : 0)

หน้า 1 ของ 2

รายงานผลการทดสอบคุณภาพน้ำ

รายงานเลขที่ : 2025/02/130

ชื่อลูกค้า : บริษัท ดับเบิล เอ (1991) จำกัด (มหาชน)

ที่อยู่ : 1 หมู่ 2 ต. ท่าตูม อ. ศรีมหาโพธิ จ. ปราจีนบุรี 25140

ตัวอย่างเลขที่ : 2025/02/130

วันที่เก็บตัวอย่าง : 4/2/2025

เวลาเก็บตัวอย่าง : 14.21 น.

วันที่รับตัวอย่าง : 4/2/2025

สถานที่เก็บตัวอย่าง : Monitoring Well 2

วันที่วิเคราะห์ : 4-11/02/2025

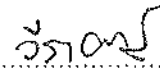
วิธีการเก็บตัวอย่าง : Grab

ชนิดตัวอย่าง : น้ำใต้ดิน

พารามิเตอร์ที่ทดสอบ	หน่วย	วิธีทดสอบ	ผลการทดสอบ	Standard*
pH	-	Electrometric Method	6.2	-
Cadmium	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.002	≤ 0.003
Copper	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.006	≤ 1.0
Nickel	mg/L	Digestion, Inductively Coupled Plasma Method	0.027	≤ 0.02
Lead	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.010	≤ 0.01
Zinc	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.004	≤ 5.0
Manganese	mg/L	Digestion, Inductively Coupled Plasma Method	0.149	≤ 0.5
Arsenic	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.006	≤ 0.01
Hexavalent Chromium	mg/L	Filtration, Colorimetric Method	< 0.025	≤ 0.05

ลักษณะตัวอย่าง : สีเหลือง ความขุ่นน้อย ตะกอนขนาดเล็ก แว่นลอย ไม่มีกลิ่นหมายเหตุ : วิธีวิเคราะห์ตามมาตรฐาน Standard Methods for the Examination of Water and Wastewater ,
23rd Edition, 2017 ออกโดย APHA - AWWA - WEF.

: * ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 20 พ.ศ. 2543 มาตรฐานคุณภาพน้ำใต้ดิน

ผู้เก็บตัวอย่าง : นางสาวชนานิภาณดี แสนสุข (ว-199-จ-0007)อนุมัติโดย : 

(นางวิราภรณ์ ผลเจริญ)

ว-199-ค-0003

รายงานฉบับนี้รับรองเฉพาะตัวอย่างที่ได้ทำการทดสอบเท่านั้น ห้ามนำไปคัดลอกหรือรายงานผลเพียงบางส่วน โดยไม่ได้รับอนุญาตจากห้องปฏิบัติการเป็นลายลักษณ์อักษร

122 หมู่ 2 ต.ท่าตูม อ.ศรีมหาโพธิ จ.ปราจีนบุรี 25140 โทร 02-6345230 ต่อ 3311

ฉบับที่ : 1 (แก้ไขครั้งที่ : 0)

หน้า 2 ของ 2

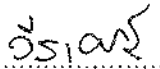
รายงานผลการทดสอบคุณภาพน้ำ

รายงานเลขที่ : 2025/02/131
 ชื่อลูกค้า : บริษัท ดับเบิล เอ (1991) จำกัด (มหาชน)
 ที่อยู่ : 1 หมู่ 2 ต. ท่าตูม อ. ศรีมหาโพธิ จ. ปราจีนบุรี 25140
 ตัวอย่างเลขที่ : 2025/02/131
 วันที่เก็บตัวอย่าง : 4/2/2025
 เวลาเก็บตัวอย่าง : 13.57 น.
 วันที่รับตัวอย่าง : 4/2/2025
 สถานที่เก็บตัวอย่าง : Monitoring Well 3
 วันที่วิเคราะห์ : 4-11/02/2025
 วิธีการเก็บตัวอย่าง : Grab
 ชนิดตัวอย่าง : น้ำใต้ดิน

พารามิเตอร์ที่ทดสอบ	หน่วย	วิธีทดสอบ	ผลการทดสอบ	Standard*
Temperature	° C	Laboratory and Field Method	30.6	-
Total Suspended Solids	mg/L	Dried at 103-105 °C	133	-
Total Dissolved Solids	mg/L	Dried at 180 °C	1305	-
COD	mgO ₂ /L	Closed Reflux, Colorimetric Method	44	-
BOD	mg/L	5 -Day BOD Test, Azide Modification Method	3.1	-

ลักษณะตัวอย่าง : สีเหลือง ความขุ่นปานกลาง ตะกอนขนาดเล็ก แขนวนลอย ไม่มีกลิ่น
หมายเหตุ : วิธีวิเคราะห์ตามมาตรฐาน Standard Methods for the Examination of Water and Wastewater ,
 23rd Edition, 2017 ออกโดย APHA - AWWA - WEF.
 : * ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 20 พ.ศ. 2543 มาตรฐานคุณภาพน้ำใต้ดิน
ผู้เก็บตัวอย่าง : นางสาวชนนิกันต์ แสงสุข



อนุมัติโดย : 
 (นางวีราภรณ์ ผลเจริญ)
 Lab Manager

รายงานฉบับนี้รับรองเฉพาะตัวอย่างที่ได้ทำการทดสอบเท่านั้น ห้ามนำไปคัดลอกหรือรายงานผลเพียงบางส่วน โดยไม่ได้รับอนุญาตจากห้องปฏิบัติการเป็นลายลักษณ์อักษร

รายงานผลการทดสอบคุณภาพน้ำ

รายงานเลขที่ : 2025/02/131

ชื่อลูกค้า : บริษัท ดับเบิล เอ (1991) จำกัด (มหาชน)

ที่อยู่ : 1 หมู่ 2 ต. ท่าตูม อ. ศรีมหาโพธิ จ. ปราจีนบุรี 25140

ตัวอย่างเลขที่ : 2025/02/131

วันที่เก็บตัวอย่าง : 4/2/2025

เวลาเก็บตัวอย่าง : 13.57 น.

วันที่รับตัวอย่าง : 4/2/2025

สถานที่เก็บตัวอย่าง : Monitoring Well 3

วันที่วิเคราะห์ : 4-11/02/2025

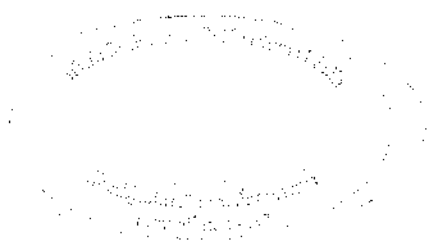
วิธีการเก็บตัวอย่าง : Grab

ชนิดตัวอย่าง : น้ำใต้ดิน

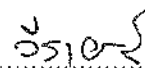
พารามิเตอร์ที่ทดสอบ	หน่วย	วิธีทดสอบ	ผลการทดสอบ	Standard*
pH	-	Electrometric Method	6.7	-
Cadmium	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.002	≤ 0.003
Copper	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.006	≤ 1.0
Nickel	mg/L	Digestion, Inductively Coupled Plasma Method	0.029	≤ 0.02
Lead	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.010	≤ 0.01
Zinc	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.004	≤ 5.0
Manganese	mg/L	Digestion, Inductively Coupled Plasma Method	0.203	≤ 0.5
Arsenic	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.006	≤ 0.01
Hexavalent Chromium	mg/L	Filtration, Colorimetric Method	< 0.025	≤ 0.05

ลักษณะตัวอย่าง : สีเหลือง ความขุ่นปานกลาง ตะกอนขนาดเล็ก แว่นลอย ไม่มีกลิ่นหมายเหตุ : วิธีวิเคราะห์ตามมาตรฐาน Standard Methods for the Examination of Water and Wastewater ,
23rd Edition, 2017 ออกโดย APHA - AWWA - WEF.

: * ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 20 พ.ศ. 2543 มาตรฐานคุณภาพน้ำใต้ดิน

ผู้เก็บตัวอย่าง : นางสาวชนิกานต์ แสนสุข (ว-199-จ-0007)

อนุมัติโดย :



(นางวีราภรณ์ ผลเจริญ)

ว-199-ค-0003

รายงานฉบับนี้รับรองเฉพาะตัวอย่างที่ได้ทำการทดสอบเท่านั้น ห้ามนำไปใช้ตัดสินหรือรายงานผลเพียงบางส่วน โดยไม่ได้รับอนุญาตจากห้องปฏิบัติการเป็นลายลักษณ์อักษร

รายงานผลการทดสอบคุณภาพน้ำ

รายงานเลขที่ : 2025/02/132
 ชื่อลูกค้า : บริษัท ดับเบิล เอ (1991) จำกัด (มหาชน)
 ที่อยู่ : 1 หมู่ 2 ต. ท่าตูม อ. ศรีมหาโพธิ จ. ปราจีนบุรี 25140
 ตัวอย่างเลขที่ : 2025/02/132
 เวลาเก็บตัวอย่าง : 13.42 น.
 สถานที่เก็บตัวอย่าง : Monitoring Well 4
 วิธีการเก็บตัวอย่าง : Grab
 วันที่เก็บตัวอย่าง : 4/2/2025
 วันที่รับตัวอย่าง : 4/2/2025
 วันที่วิเคราะห์ : 4-11/02/2025
 ชนิดตัวอย่าง : น้ำใต้ดิน

พารามิเตอร์ที่ทดสอบ	หน่วย	วิธีทดสอบ	ผลการทดสอบ	Standard*
Temperature	° C	Laboratory and Field Method	30.5	-
Total Suspended Solids	mg/L	Dried at 103-105 °C	104	-
Total Dissolved Solids	mg/L	Dried at 180 °C	1363	-
COD	mgO ₂ /L	Closed Reflux, Colorimetric Method	55	-
BOD	mg/L	5 -Day BOD Test, Azide Modification Method	1.1	-

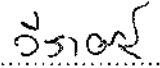
ลักษณะตัวอย่าง : สีน้ำตาล ความขุ่นปานกลาง ตะกอนขนาดเล็ก แฉวนลอย ไม่มีกลิ่น

หมายเหตุ : วิธีวิเคราะห์ตามมาตรฐาน Standard Methods for the Examination of Water and Wastewater .
 23rd Edition, 2017 ออกโดย APHA - AWWA - WEF.

* ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 20 พ.ศ. 2543 มาตรฐานคุณภาพน้ำใต้ดิน

ผู้เก็บตัวอย่าง : นางสาวชนนิกันต์ แสนสุข



อนุมัติโดย : 

(นางวีราภรณ์ ผลเจริญ)

Lab Manager

รายงานฉบับนี้รับรองเฉพาะตัวอย่างที่ได้ทำการทดสอบเท่านั้น ห้ามนำไปคัดลอกหรือรายงานผลเพียงบางส่วน โดยไม่ได้รับอนุญาตจากห้องปฏิบัติการเป็นลายลักษณ์อักษร

รายงานผลการทดสอบคุณภาพน้ำ

รายงานเลขที่ : 2025/02/132

ชื่อลูกค้า : บริษัท ดับเบิล เอ (1991) จำกัด (มหาชน)

ที่อยู่ : 1 หมู่ 2 ต. ท่าตูม อ. ศรีมหาโพธิ์ จ. ปราจีนบุรี 25140

ตัวอย่างเลขที่ : 2025/02/132

วันที่เก็บตัวอย่าง : 4/2/2025

เวลาเก็บตัวอย่าง : 13.42 น.

วันที่รับตัวอย่าง : 4/2/2025

สถานที่เก็บตัวอย่าง : Monitoring Well 4

วันที่วิเคราะห์ : 4-11/02/2025

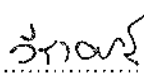
วิธีการเก็บตัวอย่าง : Grab

ชนิดตัวอย่าง : น้ำใต้ดิน

พารามิเตอร์ที่ทดสอบ	หน่วย	วิธีทดสอบ	ผลการทดสอบ	Standard*
pH	-	Electrometric Method	6.6	-
Cadmium	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.002	≤ 0.003
Copper	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.006	≤ 1.0
Nickel	mg/L	Digestion, Inductively Coupled Plasma Method	0.024	≤ 0.02
Lead	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.010	≤ 0.01
Zinc	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.004	≤ 5.0
Manganese	mg/L	Digestion, Inductively Coupled Plasma Method	0.485	≤ 0.5
Arsenic	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.006	≤ 0.01
Hexavalent Chromium	mg/L	Filtration, Colorimetric Method	< 0.025	≤ 0.05

ลักษณะตัวอย่าง : สีนํ้าตาล ความขุ่นปานกลาง ตะกอนขนาดเล็ก แฉวนลอย ไม่มีกลิ่นหมายเหตุ : วิธีวิเคราะห์ตามมาตรฐาน Standard Methods for the Examination of Water and Wastewater ,
23rd Edition, 2017 ออกโดย APHA - AWWA - WEF.

* ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 20 พ.ศ. 2543 มาตรฐานคุณภาพน้ำใต้ดิน

ผู้เก็บตัวอย่าง : นางสาวชนนิกานต์ แสนสุข (ว-199-จ-0007)อนุมัติโดย : 

(นางวีราภรณ์ ผลเจริญ)

ว-199-ค-0003

รายงานฉบับนี้รับรองเฉพาะตัวอย่างที่ได้ทำการทดสอบเท่านั้น ห้ามนำไปคัดลอกหรือรายงานผลเพียงบางส่วน โดยไม่ได้รับอนุญาตจากห้องปฏิบัติการเป็นลายลักษณ์อักษร

รายงานผลการทดสอบคุณภาพน้ำ

รายงานเลขที่ : 2025/03/136
 ชื่อลูกค้า : บริษัท ดับเบิล เอ (1991) จำกัด (มหาชน)
 ที่อยู่ : 1 หมู่ 2 ต. ท่าตูม อ. ศรีมหาโพธิ จ. ปราจีนบุรี 25140
 ตัวอย่างเลขที่ : 2025/03/136 วันที่เก็บตัวอย่าง : 3/3/2025
 เวลาเก็บตัวอย่าง : 15.12 น. วันที่รับตัวอย่าง : 3/3/2025
 สถานที่เก็บตัวอย่าง : Monitoring Well 1 วันที่วิเคราะห์ : 3-10/03/2025
 วิธีการเก็บตัวอย่าง : Grab ชนิดตัวอย่าง : น้ำใต้ดิน

พารามิเตอร์ที่ทดสอบ	หน่วย	วิธีทดสอบ	ผลการทดสอบ	Standard*
Temperature	° C	Laboratory and Field Method	29.0	-
Total Suspended Solids	mg/L	Dried at 103-105 °C	17	-
Total Dissolved Solids	mg/L	Dried at 180 °C	1314	-
COD	mgO ₂ /L	Closed Reflux, Colorimetric Method	25	-
BOD	mg/L	5 -Day BOD Test, Azide Modification Method	0.2	-

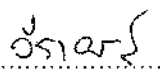
ลักษณะตัวอย่าง : สีเหลือง ความขุ่นน้อย ตะกอนขนาดเล็ก แว่นลอย ไม่มีกลิ่น

หมายเหตุ : วิเคราะห์ตามมาตรฐาน Standard Methods for the Examination of Water and Wastewater ,
23rd Edition, 2017 ออกโดย APHA - AWWA - WEF.

: * ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 20 พ.ศ. 2543 มาตรฐานคุณภาพน้ำใต้ดิน

ผู้เก็บตัวอย่าง : นางสาวชนิกานต์ แสนสุข



อนุมัติโดย : 

(นางวีราภรณ์ ผลเจริญ)

Lab Manager

รายงานฉบับนี้รับรองเฉพาะตัวอย่างที่ได้ทำการทดสอบเท่านั้น ห้ามนำไปคัดลอกหรือรายงานผลเพียงบางส่วน โดยไม่ได้รับอนุญาตจากห้องปฏิบัติการเป็นลายลักษณ์อักษร

รายงานผลการทดสอบคุณภาพน้ำ

รายงานเลขที่ : 2025/03/136
 ชื่อลูกค้า : บริษัท ดับเบิล เอ (1991) จำกัด (มหาชน)
 ที่อยู่ : 1 หมู่ 2 ต. ท่าตูม อ. ศรีมหาโพธิ จ. ปราจีนบุรี 25140
 ตัวอย่างเลขที่ : 2025/03/136
 วันที่เก็บตัวอย่าง : 3/3/2025
 เวลาเก็บตัวอย่าง : 15.12 น.
 วันที่รับตัวอย่าง : 3/3/2025
 สถานที่เก็บตัวอย่าง : Monitoring Well 1
 วันที่วิเคราะห์ : 3-10/03/2025
 วิธีการเก็บตัวอย่าง : Grab
 ชนิดตัวอย่าง : น้ำใต้ดิน

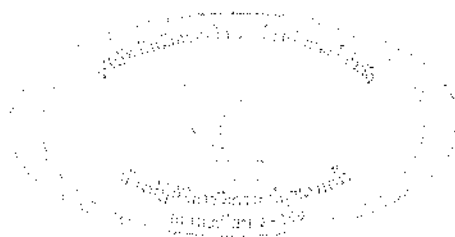
พารามิเตอร์ที่ทดสอบ	หน่วย	วิธีทดสอบ	ผลการทดสอบ	Standard*
pH	-	Electrometric Method	6.1	-
Cadmium	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.002	≤ 0.003
Copper	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.006	≤ 1.0
Nickel	mg/L	Digestion, Inductively Coupled Plasma Method	0.024	≤ 0.02
Lead	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.010	≤ 0.01
Zinc	mg/L	Digestion, Inductively Coupled Plasma Method	0.013	≤ 5.0
Manganese	mg/L	Digestion, Inductively Coupled Plasma Method	1.491	≤ 0.5
Arsenic	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.006	≤ 0.01
Hexavalent Chromium	mg/L	Filtration, Colorimetric Method	< 0.025	≤ 0.05

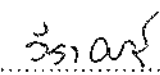
ลักษณะตัวอย่าง : สีเหลือง ความขุ่นน้อย ตะกอนขนาดเล็ก แว่นลอย ไม่มีกลิ่น

หมายเหตุ : วิเคราะห์ตามมาตรฐาน Standard Methods for the Examination of Water and Wastewater ,
23rd Edition, 2017 ออกโดย APHA - AWWA - WEF.

* ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 20 พ.ศ. 2543 มาตรฐานคุณภาพน้ำใต้ดิน

ผู้เก็บตัวอย่าง : นางสาวชนิกานต์ แสนสุข (ว-199-ค-0007)



อนุมัติโดย : 

(นางวีราภรณ์ ผลเจริญ)

ว-199-ค-0003

รายงานฉบับนี้รับรองเฉพาะตัวอย่างที่ได้ทำการทดสอบเท่านั้น ห้ามนำไปคัดลอกหรือรายงานผลเพียงบางส่วน โดยไม่ได้รับอนุญาตจากห้องปฏิบัติการเป็นลายลักษณ์อักษร

122 หมู่ 2 ต.ท่าตูม อ.ศรีมหาโพธิ จ.ปราจีนบุรี 25140 โทร 02-6345230 ต่อ 3311

ฉบับที่ : 1 (แก้ไขครั้งที่ : 0)

หน้า 2 ของ 2

รายงานผลการทดสอบคุณภาพน้ำ

รายงานเลขที่ : 2025/03/137
 ชื่อลูกค้า : บริษัท ดับเบิล เอ (1991) จำกัด (มหาชน)
 ที่อยู่ : 1 หมู่ 2 ต. ท่าตูม อ. ศรีมหาโพธิ จ. ปราจีนบุรี 25140
 ตัวอย่างเลขที่ : 2025/03/137
 เวลาเก็บตัวอย่าง : 14.55 น.
 สถานที่เก็บตัวอย่าง : Monitoring Well 2
 วิธีการเก็บตัวอย่าง : Grab

วันที่เก็บตัวอย่าง : 3/3/2025
 วันที่รับตัวอย่าง : 3/3/2025
 วันที่วิเคราะห์ : 3-10/03/2025
 ชนิดตัวอย่าง : น้ำใต้ดิน

พารามิเตอร์ที่ทดสอบ	หน่วย	วิธีทดสอบ	ผลการทดสอบ	Standard*
Temperature	° C	Laboratory and Field Method	30.2	-
Total Suspended Solids	mg/L	Dried at 103-105 °C	8	-
Total Dissolved Solids	mg/L	Dried at 180 °C	1275	-
COD	mgO ₂ /L	Closed Reflux, Colorimetric Method	18	-
BOD	mg/L	5 -Day BOD Test, Azide Modification Method	0.2	-

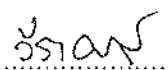
ลักษณะตัวอย่าง : สีเหลือง ความขุ่นน้อย ตะกอนขนาดเล็ก แฉวนลอย ไม่มีกลิ่น

หมายเหตุ : วิธีวิเคราะห์ตามมาตรฐาน Standard Methods for the Examination of Water and Wastewater ,
 23rd Edition, 2017 ออกโดย APHA - AWWA - WEF.

: * ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 20 พ.ศ. 2543 มาตรฐานคุณภาพน้ำใต้ดิน

ผู้เก็บตัวอย่าง : นางสาวชนนิกานต์ แสนสุข



อนุมัติโดย : 

(นางวีราภรณ์ ผลเจริญ)

Lab Manager

รายงานฉบับนี้รับรองเฉพาะตัวอย่างที่ได้ทำการทดสอบเท่านั้น ห้ามนำไปตีตลาดหรือรายงานผลเพียงบางส่วน โดยไม่ได้รับอนุญาตจากห้องปฏิบัติการเป็นลายลักษณ์อักษร

รายงานผลการทดสอบคุณภาพน้ำ

รายงานเลขที่ : 2025/03/137
 ชื่อลูกค้า : บริษัท ดับเบิล เอ (1991) จำกัด (มหาชน)
 ที่อยู่ : 1 หมู่ 2 ต. ท่าตูม อ. ศรีมหาโพธิ จ. ปราจีนบุรี 25140
 ตัวอย่างเลขที่ : 2025/03/137 วันที่เก็บตัวอย่าง : 3/3/2025
 เวลาเก็บตัวอย่าง : 14.55 น. วันที่รับตัวอย่าง : 3/3/2025
 สถานที่เก็บตัวอย่าง : Monitoring Well 2 วันที่วิเคราะห์ : 3-10/03/2025
 วิธีการเก็บตัวอย่าง : Grab ชนิดตัวอย่าง : น้ำใต้ดิน

พารามิเตอร์ที่ทดสอบ	หน่วย	วิธีทดสอบ	ผลการทดสอบ	Standard*
pH	-	Electrometric Method	6.4	-
Cadmium	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.002	≤ 0.003
Copper	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.006	≤ 1.0
Nickel	mg/L	Digestion, Inductively Coupled Plasma Method	0.026	≤ 0.02
Lead	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.010	≤ 0.01
Zinc	mg/L	Digestion, Inductively Coupled Plasma Method	0.021	≤ 5.0
Manganese	mg/L	Digestion, Inductively Coupled Plasma Method	0.126	≤ 0.5
Arsenic	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.006	≤ 0.01
Hexavalent Chromium	mg/L	Filtration, Colorimetric Method	< 0.025	≤ 0.05

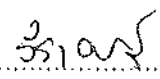
ลักษณะตัวอย่าง : สีเหลือง ความขุ่นน้อย ตะกอนขนาดเล็ก แฉวนลอย ไม่มีกลิ่น

หมายเหตุ : วิธีวิเคราะห์ตามมาตรฐาน Standard Methods for the Examination of Water and Wastewater ,
 23rd Edition, 2017 ออกโดย APHA - AWWA - WEF.

* ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 20 พ.ศ. 2543 มาตรฐานคุณภาพน้ำใต้ดิน

ผู้เก็บตัวอย่าง : นางสาวชนนิกานต์ แสงสุข (ว-199-จ-0007)



อนุมัติโดย : 

(นางวีราภรณ์ ผลเจริญ)

ว-199-ค-0003

รายงานฉบับนี้รับรองเฉพาะตัวอย่างที่ได้ทำการทดสอบเท่านั้น ห้ามนำไปคัดลอกหรือรายงานผลเพียงบางส่วน โดยไม่ได้รับอนุญาตจากห้องปฏิบัติการเป็นลายลักษณ์อักษร

122 หมู่ 2 ต.ท่าตูม อ.ศรีมหาโพธิ จ.ปราจีนบุรี 25140 โทร 02-6345230 ต่อ 3311

ฉบับที่ : 1 (แก้ไขครั้งที่ : 0)

หน้า 2 ของ 2

รายงานผลการทดสอบคุณภาพน้ำ

รายงานเลขที่ : 2025/03/138
 ชื่อลูกค้า : บริษัท ดับเบิล เอ (1991) จำกัด (มหาชน)
 ที่อยู่ : 1 หมู่ 2 ต. ท่าตูม อ. ศรีมหาโพธิ จ. ปราจีนบุรี 25140
 ตัวอย่างเลขที่ : 2025/03/138
 เวลาเก็บตัวอย่าง : 14.26 น.
 สถานที่เก็บตัวอย่าง : Monitoring Well 3
 วิธีการเก็บตัวอย่าง : Grab

วันที่เก็บตัวอย่าง : 3/3/2025
 วันที่รับตัวอย่าง : 3/3/2025
 วันที่วิเคราะห์ : 3-10/03/2025
 ชนิดตัวอย่าง : น้ำใต้ดิน

พารามิเตอร์ที่ทดสอบ	หน่วย	วิธีทดสอบ	ผลการทดสอบ	Standard*
Temperature	° C	Laboratory and Field Method	30.1	-
Total Suspended Solids	mg/L	Dried at 103-105 °C	52	-
Total Dissolved Solids	mg/L	Dried at 180 °C	1314	-
COD	mgO ₂ /L	Closed Reflux, Colorimetric Method	27	-
BOD	mg/L	5 -Day BOD Test, Azide Modification Method	2.3	-

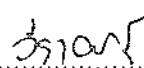
ลักษณะตัวอย่าง : สีเหลือง ความขุ่นปานกลาง ตะกอนขนาดเล็ก แววนลอย ไม่มีกลิ่น

หมายเหตุ : วิธีวิเคราะห์ตามมาตรฐาน Standard Methods for the Examination of Water and Wastewater ,
 23rd Edition, 2017 ออกโดย APHA - AWWA - WEF.

: * ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 20 พ.ศ. 2543 มาตรฐานคุณภาพน้ำใต้ดิน

ผู้เก็บตัวอย่าง : นางสาวชนิกานต์ แสนสุข



อนุมัติโดย : 

(นางวีราภรณ์ ผลเจริญ)

Lab Manager

รายงานฉบับนี้รับรองเฉพาะตัวอย่างที่ได้ทำการทดสอบเท่านั้น ห้ามนำไปตีตลาดหรือรายงานผลเพียงบางส่วน โดยไม่ได้รับอนุญาตจากห้องปฏิบัติการเป็นลายลักษณ์อักษร

รายงานผลการทดสอบคุณภาพน้ำ

รายงานเลขที่ : 2025/03/138
 ชื่อลูกค้า : บริษัท ดับเบิล เอ (1991) จำกัด (มหาชน)
 ที่อยู่ : 1 หมู่ 2 ต. ท่าตูม อ. ศรีมหาโพธิ จ. ปราจีนบุรี 25140
 ตัวอย่างเลขที่ : 2025/03/138 วันที่เก็บตัวอย่าง : 3/3/2025
 เวลาเก็บตัวอย่าง : 14.26 น. วันที่รับตัวอย่าง : 3/3/2025
 สถานที่เก็บตัวอย่าง : Monitoring Well 3 วันที่วิเคราะห์ : 3-10/03/2025
 วิธีการเก็บตัวอย่าง : Grab ชนิดตัวอย่าง : น้ำใต้ดิน

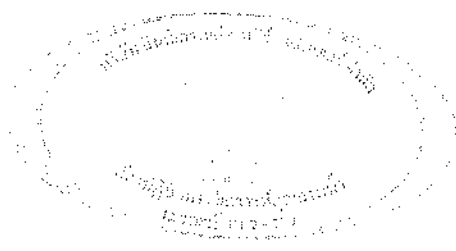
พารามิเตอร์ที่ทดสอบ	หน่วย	วิธีทดสอบ	ผลการทดสอบ	Standard*
pH	-	Electrometric Method	6.3	-
Cadmium	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.002	≤ 0.003
Copper	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.006	≤ 1.0
Nickel	mg/L	Digestion, Inductively Coupled Plasma Method	0.024	≤ 0.02
Lead	mg/L	Digestion, Inductively Coupled Plasma Method	0.020	≤ 0.01
Zinc	mg/L	Digestion, Inductively Coupled Plasma Method	0.010	≤ 5.0
Manganese	mg/L	Digestion, Inductively Coupled Plasma Method	0.207	≤ 0.5
Arsenic	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.006	≤ 0.01
Hexavalent Chromium	mg/L	Filtration, Colorimetric Method	< 0.025	≤ 0.05

ลักษณะตัวอย่าง : สีเหลือง ความขุ่นปานกลาง ตะกอนขนาดเล็ก แฉวนลอย ไม่มีกลิ่น

หมายเหตุ : วิธีวิเคราะห์ตามมาตรฐาน Standard Methods for the Examination of Water and Wastewater ,
 23rd Edition, 2017 ออกโดย APHA - AWWA - WEF.

: * ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 20 พ.ศ. 2543 มาตรฐานคุณภาพน้ำใต้ดิน

ผู้เก็บตัวอย่าง : นางสาวชนนิกานต์ แสนสุข (ว-199-จ-0007)



อนุมัติโดย : วิราภรณ์

(นางวิราภรณ์ ผลเจริญ)

ว-199-ค-0003

รายงานฉบับนี้รับรองเฉพาะตัวอย่างที่ได้ทำการทดสอบเท่านั้น ห้ามนำไปคัดลอกหรือรายงานผลเพียงบางส่วน โดยไม่ได้รับอนุญาตจากห้องปฏิบัติการเป็นลายลักษณ์อักษร

รายงานผลการทดสอบคุณภาพน้ำ

รายงานเลขที่ : 2025/03/139
 ชื่อลูกค้า : บริษัท ดับเบิล เอ (1991) จำกัด (มหาชน)
 ที่อยู่ : 1 หมู่ 2 ต. ท่าตูม อ. ศรีมหาโพธิ จ. ปราจีนบุรี 25140
 ตัวอย่างเลขที่ : 2025/03/139 วันที่เก็บตัวอย่าง : 3/3/2025
 เวลาเก็บตัวอย่าง : 14.06 น. วันที่รับตัวอย่าง : 3/3/2025
 สถานที่เก็บตัวอย่าง : Monitoring Well 4 วันที่วิเคราะห์ : 3-10/03/2025
 วิธีการเก็บตัวอย่าง : Grab ชนิดตัวอย่าง : น้ำใต้ดิน

พารามิเตอร์ที่ทดสอบ	หน่วย	วิธีทดสอบ	ผลการทดสอบ	Standard*
Temperature	° C	Laboratory and Field Method	30.1	-
Total Suspended Solids	mg/L	Dried at 103-105 °C	179	-
Total Dissolved Solids	mg/L	Dried at 180 °C	1433	-
COD	mgO ₂ /L	Closed Reflux, Colorimetric Method	32	-
BOD	mg/L	5 -Day BOD Test, Azide Modification Method	1.8	-

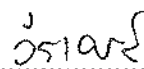
ลักษณะตัวอย่าง : สีเหลือง ความขุ่นปานกลาง ตะกอนขนาดเล็ก แขนวนลอย ไม่มีกลิ่น

หมายเหตุ : วิธีวิเคราะห์ตามมาตรฐาน Standard Methods for the Examination of Water and Wastewater ,
23rd Edition, 2017 ออกโดย APHA - AWWA - WEF.

: * ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 20 พ.ศ. 2543 มาตรฐานคุณภาพน้ำใต้ดิน

ผู้เก็บตัวอย่าง : นางสาวชนนิกานต์ แสนสุข



อนุมัติโดย : 

(นางวีราภรณ์ ผลเจริญ)

Lab Manager

รายงานฉบับนี้รับรองเฉพาะตัวอย่างที่ได้ทำการทดสอบเท่านั้น ห้ามนำไปคัดลอกหรือรายงานผลเพียงบางส่วน โดยไม่ได้รับอนุญาตจากห้องปฏิบัติการเป็นลายลักษณ์อักษร



รายงานผลการทดสอบคุณภาพน้ำ

รายงานเลขที่ : 2025/03/139
 ชื่อลูกค้า : บริษัท ดับเบิล เอ (1991) จำกัด (มหาชน)
 ที่อยู่ : 1 หมู่ 2 ต. ท่าตูม อ. ศรีมหาโพธิ จ. ปราจีนบุรี 25140
 ตัวอย่างเลขที่ : 2025/03/139
 วันที่เก็บตัวอย่าง : 3/3/2025
 เวลาเก็บตัวอย่าง : 14.06 น.
 วันที่รับตัวอย่าง : 3/3/2025
 สถานที่เก็บตัวอย่าง : Monitoring Well 4
 วันที่วิเคราะห์ : 3-10/03/2025
 วิธีการเก็บตัวอย่าง : Grab
 ชนิดตัวอย่าง : น้ำใต้ดิน

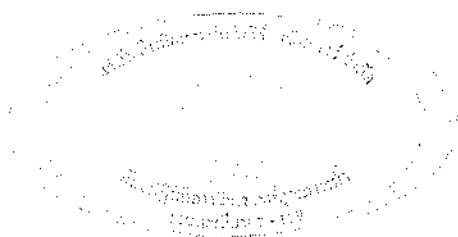
พารามิเตอร์ที่ทดสอบ	หน่วย	วิธีทดสอบ	ผลการทดสอบ	Standard*
pH	-	Electrometric Method	6.6	-
Cadmium	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.002	≤ 0.003
Copper	mg/L	Digestion, Inductively Coupled Plasma Method	0.006	≤ 1.0
Nickel	mg/L	Digestion, Inductively Coupled Plasma Method	0.026	≤ 0.02
Lead	mg/L	Digestion, Inductively Coupled Plasma Method	0.022	≤ 0.01
Zinc	mg/L	Digestion, Inductively Coupled Plasma Method	0.013	≤ 5.0
Manganese	mg/L	Digestion, Inductively Coupled Plasma Method	0.486	≤ 0.5
Arsenic	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.006	≤ 0.01
Hexavalent Chromium	mg/L	Filtration, Colorimetric Method	< 0.025	≤ 0.05

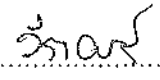
ลักษณะตัวอย่าง : สีเหลือง ความขุ่นปานกลาง ตะกอนขนาดเล็ก แว่นลอย ไม่มีกลิ่น

หมายเหตุ : วิธีวิเคราะห์ตามมาตรฐาน Standard Methods for the Examination of Water and Wastewater , 23rd Edition, 2017 ออกโดย APHA - AWWA - WEF.

* ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 20 พ.ศ. 2543 มาตรฐานคุณภาพน้ำใต้ดิน

ผู้เก็บตัวอย่าง : นางสาวชนิกานต์ แสนสุข (ว-199-จ-0007)



อนุมัติโดย : 

(นางวีราภรณ์ ผลเจริญ)

ว-199-ค-0003

รายงานฉบับนี้รับรองเฉพาะตัวอย่างที่ได้ทำการทดสอบเท่านั้น ห้ามนำไปคัดลอกหรือรายงานผลเพียงบางส่วน โดยไม่ได้รับอนุญาตจากห้องปฏิบัติการเป็นลายลักษณ์อักษร

รายงานผลการทดสอบคุณภาพน้ำ

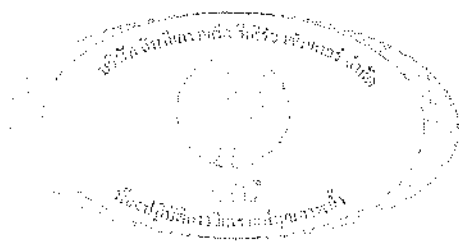
รายงานเลขที่ : 2025/04/135
 ชื่อลูกค้า : บริษัท ดับเบิล เอ (1991) จำกัด (มหาชน)
 ที่อยู่ : 1 หมู่ 2 ต. ท่าตูม อ. ศรีมหาโพธิ จ. ปราจีนบุรี 25140
 ตัวอย่างเลขที่ : 2025/04/135 วันที่เก็บตัวอย่าง : 1/4/2025
 เวลาเก็บตัวอย่าง : 15.25 น. วันที่รับตัวอย่าง : 1/4/2025
 สถานที่เก็บตัวอย่าง : Monitoring Well 1 วันที่วิเคราะห์ : 1-8/04/2025
 วิธีการเก็บตัวอย่าง : Grab ชนิดตัวอย่าง : น้ำใต้ดิน

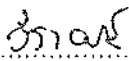
พารามิเตอร์ที่ทดสอบ	หน่วย	วิธีทดสอบ	ผลการทดสอบ	Standard*
Temperature	° C	Laboratory and Field Method	30.8	-
Total Suspended Solids	mg/L	Dried at 103-105 °C	21	-
Total Dissolved Solids	mg/L	Dried at 180 °C	1344	-
COD	mgO ₂ /L	Closed Reflux, Colorimetric Method	8	-
BOD	mg/L	5 -Day BOD Test, Azide Modification Method	0.1	-

ลักษณะตัวอย่าง : ไม่มีสี ความขุ่นปานกลาง ตะกอนขนาดเล็ก แฉวนลอย ไม่มีกลิ่น

หมายเหตุ : วิเคราะห์ตามมาตรฐาน Standard Methods for the Examination of Water and Wastewater ,
 23rd Edition, 2017 ออกโดย APHA - AWWA - WEF.
 * ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 20 พ.ศ. 2543 มาตรฐานคุณภาพน้ำใต้ดิน

ผู้เก็บตัวอย่าง : นางสาวชนิกานต์ แสนสุข



อนุมัติโดย : 

(นางวีราภรณ์ ผลเจริญ)

Lab Manager

รายงานฉบับนี้รับรองเฉพาะตัวอย่างที่ได้ทำการทดสอบเท่านั้น ห้ามนำไปตีตลาดหรือรายงานผลเพียงบางส่วน โดยไม่ได้รับอนุญาตจากห้องปฏิบัติการเป็นลายลักษณ์อักษร

รายงานผลการทดสอบคุณภาพน้ำ

รายงานเลขที่ : 2025/04/135
 ชื่อลูกค้า : บริษัท ดับเบิล เอ (1991) จำกัด (มหาชน)
 ที่อยู่ : 1 หมู่ 2 ต. ท่าตูม อ. ศรีมหาโพธิ จ. ปราจีนบุรี 25140
 ตัวอย่างเลขที่ : 2025/04/135
 เวลาเก็บตัวอย่าง : 15.25 น.
 สถานที่เก็บตัวอย่าง : Monitoring Well 1
 วิธีการเก็บตัวอย่าง : Grab
 วันที่เก็บตัวอย่าง : 1/4/2025
 วันที่รับตัวอย่าง : 1/4/2025
 วันที่วิเคราะห์ : 1-8/04/2025
 ชนิดตัวอย่าง : น้ำใต้ดิน

พารามิเตอร์ที่ทดสอบ	หน่วย	วิธีทดสอบ	ผลการทดสอบ	Standard*
pH	-	Electrometric Method	6.3	-
Cadmium	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.002	≤ 0.003
Copper	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.006	≤ 1.0
Nickel	mg/L	Digestion, Inductively Coupled Plasma Method	0.023	≤ 0.02
Lead	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.010	≤ 0.01
Zinc	mg/L	Digestion, Inductively Coupled Plasma Method	0.007	≤ 5.0
Manganese	mg/L	Digestion, Inductively Coupled Plasma Method	1.550	≤ 0.5
Arsenic	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.006	≤ 0.01
Hexavalent Chromium	mg/L	Filtration, Colorimetric Method	< 0.025	≤ 0.05

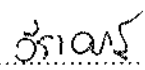
ลักษณะตัวอย่าง : ไม่มีสี ความขุ่นปานกลาง ตะกอนขนาดเล็ก แขนงลอย ไม่มีกลิ่น

หมายเหตุ : วิเคราะห์ตามมาตรฐาน Standard Methods for the Examination of Water and Wastewater , 23rd Edition, 2017 ออกโดย APHA - AWWA - WEF.

* ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 20 พ.ศ. 2543 มาตรฐานคุณภาพน้ำใต้ดิน

ผู้เก็บตัวอย่าง : นางสาวชนิกานต์ แสนสุข (ว-199-จ-0007)



อนุมัติโดย : 

(นางวีราภรณ์ ผลเจริญ)

ว-199-ค-0003

รายงานฉบับนี้รับรองเฉพาะตัวอย่างที่ได้ทำการทดสอบเท่านั้น ห้ามนำไปคัดลอกหรือรายงานผลเพียงบางส่วน โดยไม่ได้รับอนุญาตจากห้องปฏิบัติการเป็นลายลักษณ์อักษร

122 หมู่ 2 ต.ท่าตูม อ.ศรีมหาโพธิ จ.ปราจีนบุรี 25140 โทร 02-6345230 ต่อ 3311

ฉบับที่ : 1 (แก้ไขครั้งที่ : 0)

หน้า 2 ของ 2

รายงานผลการทดสอบคุณภาพน้ำ

รายงานเลขที่ : 2025/04/136
 ชื่อลูกค้า : บริษัท ดับเบิล เอ (1991) จำกัด (มหาชน)
 ที่อยู่ : 1 หมู่ 2 ต. ท่าตูม อ. ศรีมหาโพธิ จ. ปราจีนบุรี 25140
 ตัวอย่างเลขที่ : 2025/04/136
 เวลาเก็บตัวอย่าง : 15.40 น.
 สถานที่เก็บตัวอย่าง : Monitoring Well 2
 วิธีการเก็บตัวอย่าง : Grab
 วันที่เก็บตัวอย่าง : 1/4/2025
 วันที่รับตัวอย่าง : 1/4/2025
 วันที่วิเคราะห์ : 1-8/04/2025
 ชนิดตัวอย่าง : น้ำใต้ดิน

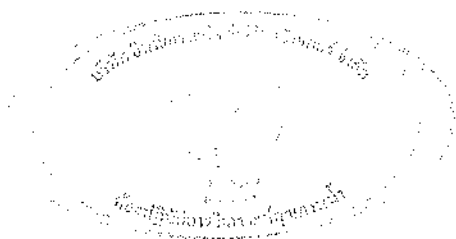
พารามิเตอร์ที่ทดสอบ	หน่วย	วิธีทดสอบ	ผลการทดสอบ	Standard*
Temperature	° C	Laboratory and Field Method	31.2	-
Total Suspended Solids	mg/L	Dried at 103-105 °C	11	-
Total Dissolved Solids	mg/L	Dried at 180 °C	1326	-
COD	mgO ₂ /L	Closed Reflux, Colorimetric Method	13	-
BOD	mg/L	5 -Day BOD Test, Azide Modification Method	0.7	-

ลักษณะตัวอย่าง : ไม่มีสี ความขุ่นน้อย ตะกอนขนาดเล็ก แขนวลอย ไม่มีกลิ่น

หมายเหตุ : วิเคราะห์ตามมาตรฐาน Standard Methods for the Examination of Water and Wastewater ,
23rd Edition, 2017 ออกโดย APHA - AWWA - WEF.

: * ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 20 พ.ศ. 2543 มาตรฐานคุณภาพน้ำใต้ดิน

ผู้เก็บตัวอย่าง : นางสาวชนิกานต์ แสนสุข



อนุมัติโดย : วิภากร

(นางวิภากรณ์ ผลเจริญ)

Lab Manager

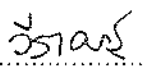
รายงานฉบับนี้รับรองเฉพาะตัวอย่างที่ได้ทำการทดสอบเท่านั้น ห้ามนำไปคัดลอกหรือรายงานผลเพียงบางส่วน โดยไม่ได้รับอนุญาตจากห้องปฏิบัติการเป็นลายลักษณ์อักษร

รายงานผลการทดสอบคุณภาพน้ำ

รายงานเลขที่ : 2025/04/136
 ชื่อลูกค้า : บริษัท ดับเบิล เอ (1991) จำกัด (มหาชน)
 ที่อยู่ : 1 หมู่ 2 ต. ท่าตูม อ. ศรีมหาโพธิ จ. ปราจีนบุรี 25140
 ตัวอย่างเลขที่ : 2025/04/136
 เวลาเก็บตัวอย่าง : 15.40 น.
 สถานที่เก็บตัวอย่าง : Monitoring Well 2
 วิธีการเก็บตัวอย่าง : Grab
 วันที่เก็บตัวอย่าง : 1/4/2025
 วันที่รับตัวอย่าง : 1/4/2025
 วันที่วิเคราะห์ : 1-8/04/2025
 ชนิดตัวอย่าง : น้ำใต้ดิน

พารามิเตอร์ที่ทดสอบ	หน่วย	วิธีทดสอบ	ผลการทดสอบ	Standard*
pH	-	Electrometric Method	6.3	-
Cadmium	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.002	≤ 0.003
Copper	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.006	≤ 1.0
Nickel	mg/L	Digestion, Inductively Coupled Plasma Method	0.027	≤ 0.02
Lead	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.010	≤ 0.01
Zinc	mg/L	Digestion, Inductively Coupled Plasma Method	0.005	≤ 5.0
Manganese	mg/L	Digestion, Inductively Coupled Plasma Method	0.099	≤ 0.5
Arsenic	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.006	≤ 0.01
Hexavalent Chromium	mg/L	Filtration, Colorimetric Method	< 0.025	≤ 0.05

ลักษณะตัวอย่าง : ไม่มีสี ความขุ่นน้อย ตะกอนขนาดเล็ก แว่นลอย ไม่มีกลิ่น
หมายเหตุ : วิเคราะห์ตามมาตรฐาน Standard Methods for the Examination of Water and Wastewater ,
 23rd Edition, 2017 ออกโดย APHA - AWWA - WEF.
 * ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 20 พ.ศ. 2543 มาตรฐานคุณภาพน้ำใต้ดิน
ผู้เก็บตัวอย่าง : นางสาวชนนิกานต์ แสนสุข (ว-199-จ-0007)

 อนุมัติโดย : 

(นางวีราภรณ์ ผลเจริญ)

ว-199-ค-0003

รายงานฉบับนี้รับรองเฉพาะตัวอย่างที่ได้ทำการทดสอบเท่านั้น ห้ามนำไปคัดลอกหรือรายงานผลเพียงบางส่วน โดยไม่ได้รับอนุญาตจากห้องปฏิบัติการเป็นลายลักษณ์อักษร

122 หมู่ 2 ต.ท่าตูม อ.ศรีมหาโพธิ จ.ปราจีนบุรี 25140 โทร 02-6345230 ต่อ 3311

ฉบับที่ : 1 (แก้ไขครั้งที่ : 0)

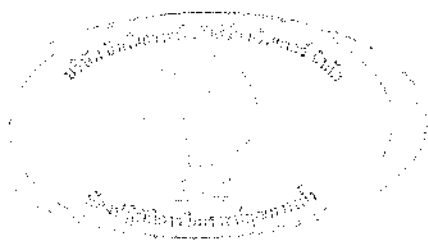
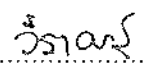
หน้า 2 ของ 2

รายงานผลการทดสอบคุณภาพน้ำ

รายงานเลขที่ : 2025/04/137
 ชื่อลูกค้า : บริษัท ดับเบิ้ล เอ (1991) จำกัด (มหาชน)
 ที่อยู่ : 1 หมู่ 2 ต. ท่าตูม อ. ศรีมหาโพธิ จ. ปราจีนบุรี 25140
 ตัวอย่างเลขที่ : 2025/04/137
 เวลาเก็บตัวอย่าง : 15.08 น.
 สถานที่เก็บตัวอย่าง : Monitoring Well 3
 วิธีการเก็บตัวอย่าง : Grab
 วันที่เก็บตัวอย่าง : 1/4/2025
 วันที่รับตัวอย่าง : 1/4/2025
 วันที่วิเคราะห์ : 1-8/04/2025
 ชนิดตัวอย่าง : น้ำใต้ดิน

พารามิเตอร์ที่ทดสอบ	หน่วย	วิธีทดสอบ	ผลการทดสอบ	Standard*
Temperature	° C	Laboratory and Field Method	31.6	-
Total Suspended Solids	mg/L	Dried at 103-105 °C	14	-
Total Dissolved Solids	mg/L	Dried at 180 °C	1360	-
COD	mgO ₂ /L	Closed Reflux, Colorimetric Method	13	-
BOD	mg/L	5 -Day BOD Test, Azide Modification Method	0.7	-

ลักษณะตัวอย่าง : สีเหลือง ความขุ่นน้อย ตะกอนขนาดเล็ก แฉวนลอย ไม่มีกลิ่น
หมายเหตุ : วิเคราะห์ตามมาตรฐาน Standard Methods for the Examination of Water and Wastewater ,
 23rd Edition, 2017 ออกโดย APHA - AWWA - WEF.
 * ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 20 พ.ศ. 2543 มาตรฐานคุณภาพน้ำใต้ดิน
ผู้เก็บตัวอย่าง : นางสาวชนิกานต์ แสนสุข

อนุมัติโดย : 

(นางวีราภรณ์ ผลเจริญ)

Lab Manager

รายงานฉบับนี้รับรองเฉพาะตัวอย่างที่ได้ทำการทดสอบเท่านั้น ห้ามนำไปคัดลอกหรือรายงานผลเพียงบางส่วน โดยไม่ได้รับอนุญาตจากห้องปฏิบัติการเป็นลายลักษณ์อักษร



IRC

บริษัท อินทิเกรटेด รีเสิร์ช เซ็นเตอร์ จำกัด

รายงานผลการทดสอบคุณภาพน้ำ

รายงานเลขที่ : 2025/04/137

ชื่อลูกค้า : บริษัท ดับเบิล เอ (1991) จำกัด (มหาชน)

ที่อยู่ : 1 หมู่ 2 ต. ท่าตูม อ. ศรีมหาโพธิ จ. ปราจีนบุรี 25140

ตัวอย่างเลขที่ : 2025/04/137

วันที่เก็บตัวอย่าง : 1/4/2565

เวลาเก็บตัวอย่าง : 15.08 น.

วันที่รับตัวอย่าง : 1/4/2565

สถานที่เก็บตัวอย่าง : Monitoring Well 3

วันที่วิเคราะห์ : 1-8/04/2565

วิธีการเก็บตัวอย่าง : Grab

ชนิดตัวอย่าง : น้ำใต้ดิน

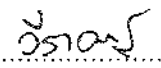
พารามิเตอร์ที่ทดสอบ	หน่วย	วิธีทดสอบ	ผลการทดสอบ	Standard*
pH	-	Electrometric Method	6.7	-
Cadmium	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.002	≤ 0.003
Copper	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.006	≤ 1.0
Nickel	mg/L	Digestion, Inductively Coupled Plasma Method	0.026	≤ 0.02
Lead	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.010	≤ 0.01
Zinc	mg/L	Digestion, Inductively Coupled Plasma Method	0.004	≤ 5.0
Manganese	mg/L	Digestion, Inductively Coupled Plasma Method	0.218	≤ 0.5
Arsenic	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.006	≤ 0.01
Hexavalent Chromium	mg/L	Filtration, Colorimetric Method	< 0.025	≤ 0.05

ลักษณะตัวอย่าง : สีเหลือง ความขุ่นน้อย ตะกอนขนาดเล็ก แว่นลอย ไม่มีกลิ่น

หมายเหตุ : วิธีวิเคราะห์ตามมาตรฐาน Standard Methods for the Examination of Water and Wastewater ,
23rd Edition, 2017 ออกโดย APHA - AWWA - WEF.

* ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 20 พ.ศ. 2543 มาตรฐานคุณภาพน้ำใต้ดิน

ผู้เก็บตัวอย่าง : นางสาวชนิกานต์ แสนสุข (ว-199-ค-0007)

อนุมัติโดย : 

(นางวีราภรณ์ ผลเจริญ)

ว-199-ค-0003

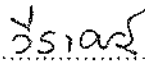
รายงานฉบับนี้รับรองเฉพาะตัวอย่างที่ได้ทำการทดสอบเท่านั้น ห้ามนำไปคัดลอกหรือรายงานผลเพียงบางส่วน โดยไม่ได้รับอนุญาตจากห้องปฏิบัติการเป็นลายลักษณ์อักษร

รายงานผลการทดสอบคุณภาพน้ำ

รายงานเลขที่ : 2025/04/138
 ชื่อลูกค้า : บริษัท ดับเบิล เอ (1991) จำกัด (มหาชน)
 ที่อยู่ : 1 หมู่ 2 ต. ท่าตูม อ. ศรีมหาโพธิ์ จ. ปราจีนบุรี 25140
 ตัวอย่างเลขที่ : 2025/04/138
 เวลาเก็บตัวอย่าง : 14.55 น.
 สถานที่เก็บตัวอย่าง : Monitoring Well 4
 วิธีการเก็บตัวอย่าง : Grab
 วันที่เก็บตัวอย่าง : 1/4/2025
 วันที่รับตัวอย่าง : 1/4/2025
 วันที่วิเคราะห์ : 1-8/04/2025
 ชนิดตัวอย่าง : น้ำใต้ดิน

พารามิเตอร์ที่ทดสอบ	หน่วย	วิธีทดสอบ	ผลการทดสอบ	Standard*
Temperature	° C	Laboratory and Field Method	32.0	-
Total Suspended Solids	mg/L	Dried at 103-105 °C	273	-
Total Dissolved Solids	mg/L	Dried at 180 °C	1418	-
COD	mgO ₂ /L	Closed Reflux, Colorimetric Method	23	-
BOD	mg/L	5-Day BOD Test, Azide Modification Method	1.1	-

ลักษณะตัวอย่าง : สีเหลือง ความขุ่นปานกลาง ตะกอนขนาดเล็ก แขนวลอย ไม่มีกลิ่น
หมายเหตุ : วิธีวิเคราะห์ตามมาตรฐาน Standard Methods for the Examination of Water and Wastewater ,
 23rd Edition, 2017 ออกโดย APHA - AWWA - WEF.
 * ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 20 พ.ศ. 2543 มาตรฐานคุณภาพน้ำใต้ดิน
ผู้เก็บตัวอย่าง : นางสาวชนนิกานต์ แสงสุข

อนุมัติโดย : 

(นางวีราภรณ์ ผลเจริญ)

Lab Manager

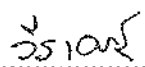
รายงานฉบับนี้รับรองเฉพาะตัวอย่างที่ได้ทำการทดสอบเท่านั้น ห้ามนำไปคัดลอกหรือรายงานผลเพียงบางส่วน โดยไม่ได้รับอนุญาตจากห้องปฏิบัติการเป็นลายลักษณ์อักษร

รายงานผลการทดสอบคุณภาพน้ำ

รายงานเลขที่ : 2025/04/138
 ชื่อลูกค้า : บริษัท ดับเบิล เอ (1991) จำกัด (มหาชน)
 ที่อยู่ : 1 หมู่ 2 ต. ท่าตูม อ. ศรีมหาโพธิ จ. ปราจีนบุรี 25140
 ตัวอย่างเลขที่ : 2025/04/138
 เวลาเก็บตัวอย่าง : 14.55 น.
 สถานที่เก็บตัวอย่าง : Monitoring Well 4
 วิธีการเก็บตัวอย่าง : Grab
 วันที่เก็บตัวอย่าง : 1/4/2025
 วันที่รับตัวอย่าง : 1/4/2025
 วันที่วิเคราะห์ : 1-8/04/2025
 ชนิดตัวอย่าง : น้ำใต้ดิน

พารามิเตอร์ที่ทดสอบ	หน่วย	วิธีทดสอบ	ผลการทดสอบ	Standard*
pH	-	Electrometric Method	7.1	-
Cadmium	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.002	≤ 0.003
Copper	mg/L	Digestion, Inductively Coupled Plasma Method	0.009	≤ 1.0
Nickel	mg/L	Digestion, Inductively Coupled Plasma Method	0.029	≤ 0.02
Lead	mg/L	Digestion, Inductively Coupled Plasma Method	0.013	≤ 0.01
Zinc	mg/L	Digestion, Inductively Coupled Plasma Method	0.013	≤ 5.0
Manganese	mg/L	Digestion, Inductively Coupled Plasma Method	0.506	≤ 0.5
Arsenic	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.006	≤ 0.01
Hexavalent Chromium	mg/L	Filtration, Colorimetric Method	0.068	≤ 0.05

ลักษณะตัวอย่าง : สีเหลือง ความขุ่นปานกลาง ตะกอนขนาดเล็ก แว่นลอย ไม่มีกลิ่น
หมายเหตุ : วิธีวิเคราะห์ตามมาตรฐาน Standard Methods for the Examination of Water and Wastewater ,
 23rd Edition, 2017 ออกโดย APHA - AWWA - WEF.
 * ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 20 พ.ศ. 2543 มาตรฐานคุณภาพน้ำใต้ดิน
ผู้เก็บตัวอย่าง : นางสาวชนิกานต์ แสนสุข (ว-199-จ-0007)

 อนุมัติโดย : 

(นางวิราภรณ์ ผลเจริญ)

ว-199-ค-0003

รายงานฉบับนี้รับรองเฉพาะตัวอย่างที่ได้ทำการทดสอบเท่านั้น ห้ามนำไปคัดลอกหรือรายงานผลเพียงบางส่วน โดยไม่ได้รับอนุญาตจากห้องปฏิบัติการเป็นลายลักษณ์อักษร

รายงานผลการทดสอบคุณภาพน้ำ

รายงานเลขที่ : 2025/05/165
 ชื่อลูกค้า : บริษัท ดับเบิล เอ (1991) จำกัด (มหาชน)
 ที่อยู่ : 1 หมู่ 2 ต. ท่าตูม อ. ศรีมหาโพธิ จ. ปราจีนบุรี 25140
 ตัวอย่างเลขที่ : 2025/05/165
 เวลาเก็บตัวอย่าง : 15.30 น.
 สถานที่เก็บตัวอย่าง : Monitoring Well 1
 วิธีการเก็บตัวอย่าง : Grab
 วันที่เก็บตัวอย่าง : 6/5/2025
 วันที่รับตัวอย่าง : 6/5/2025
 วันที่วิเคราะห์ : 6-13/05/2025
 ชนิดตัวอย่าง : น้ำใต้ดิน

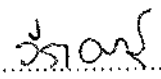
พารามิเตอร์ที่ทดสอบ	หน่วย	วิธีทดสอบ	ผลการทดสอบ	Standard*
Temperature	° C	Laboratory and Field Method	30.2	-
Total Suspended Solids	mg/L	Dried at 103-105 °C	16	-
Total Dissolved Solids	mg/L	Dried at 180 °C	1371	-
COD	mgO ₂ /L	Closed Reflux, Colorimetric Method	< 5	-
BOD	mg/L	5 -Day BOD Test, Azide Modification Method	0.3	-

ลักษณะตัวอย่าง : ไม่มีสี ความขุ่นปานกลาง ตะกอนขนาดเล็ก แขนวนลอย ไม่มีกลิ่น

หมายเหตุ : วิเคราะห์ตามมาตรฐาน Standard Methods for the Examination of Water and Wastewater ,
 23rd Edition, 2017 ออกโดย APHA - AWWA - WEF.
 : * ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 20 พ.ศ. 2543 มาตรฐานคุณภาพน้ำใต้ดิน

ผู้เก็บตัวอย่าง : นางสาวชนิกานต์ แสนสุข



อนุมัติโดย : 

(นางวีราภรณ์ ผลเจริญ)

Lab Manager

รายงานฉบับนี้รับรองเฉพาะตัวอย่างที่ได้ทำการทดสอบเท่านั้น ห้ามนำไปคัดลอกหรือรายงานผลเพียงบางส่วน โดยไม่ได้รับอนุญาตจากห้องปฏิบัติการเป็นลายลักษณ์อักษร

รายงานผลการทดสอบคุณภาพน้ำ

รายงานเลขที่ : 2025/05/165
 ชื่อลูกค้า : บริษัท ดีบีแอล เอ (1991) จำกัด (มหาชน)
 ที่อยู่ : 1 หมู่ 2 ต. ท่าตูม อ. ศรีมหาโพธิ จ. ปราจีนบุรี 25140
 ตัวอย่างเลขที่ : 2025/05/165
 เวลาเก็บตัวอย่าง : 15.30 น.
 สถานที่เก็บตัวอย่าง : Monitoring Well 1
 วิธีการเก็บตัวอย่าง : Grab
 วันที่เก็บตัวอย่าง : 6/5/2025
 วันที่รับตัวอย่าง : 6/5/2025
 วันที่วิเคราะห์ : 6-13/05/2025
 ชนิดตัวอย่าง : น้ำใต้ดิน

พารามิเตอร์ที่ทดสอบ	หน่วย	วิธีทดสอบ	ผลการทดสอบ	Standard*
pH	-	Electrometric Method	6.3	-
Cadmium	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.002	≤ 0.003
Copper	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.006	≤ 1.0
Nickel	mg/L	Digestion, Inductively Coupled Plasma Method	0.023	≤ 0.02
Lead	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.010	≤ 0.01
Zinc	mg/L	Digestion, Inductively Coupled Plasma Method	0.008	≤ 5.0
Manganese	mg/L	Digestion, Inductively Coupled Plasma Method	1.594	≤ 0.5
Arsenic	mg/L	Digestion, Inductively Coupled Plasma Method	0.012	≤ 0.01
Hexavalent Chromium	mg/L	Filtration, Colorimetric Method	0.038	≤ 0.05

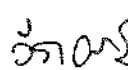
ลักษณะตัวอย่าง : ไม่มีสี ความขุ่นปานกลาง ตะกอนขนาดเล็ก แหวนลอย ไม่มีกลิ่น

หมายเหตุ : วิเคราะห์ตามมาตรฐาน Standard Methods for the Examination of Water and Wastewater ,
23rd Edition, 2017 ออกโดย APHA - AWWA - WEF.

: * ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 20 พ.ศ. 2543 มาตรฐานคุณภาพน้ำใต้ดิน

ผู้เก็บตัวอย่าง : นางสาวชนิกานต์ แสนสุข (ว-199-จ-0007)



อนุมัติโดย : 

(นางวิภาภรณ์ ผลเจริญ)

ว-199-ค-0003

รายงานฉบับนี้รับรองเฉพาะตัวอย่างที่ได้ทำการทดสอบเท่านั้น ห้ามนำไปคัดลอกหรือรายงานผลเพียงบางส่วน โดยไม่ได้รับอนุญาตจากห้องปฏิบัติการเป็นลายลักษณ์อักษร

122 หมู่ 2 ต.ท่าตูม อ.ศรีมหาโพธิ จ.ปราจีนบุรี 25140 โทร 02-6345230 ต่อ 3311

ฉบับที่ : 1 (แก้ไขครั้งที่ : 0)

หน้า 2 ของ 2

รายงานผลการทดสอบคุณภาพน้ำ

รายงานเลขที่ : 2025/05/166
 ชื่อลูกค้า : บริษัท ดับเบิล เอ (1991) จำกัด (มหาชน)
 ที่อยู่ : 1 หมู่ 2 ต. ท่าตูม อ. ศรีมหาโพธิ จ. ปราจีนบุรี 25140
 ตัวอย่างเลขที่ : 2025/05/166
 เวลาเก็บตัวอย่าง : 15.15 น.
 สถานที่เก็บตัวอย่าง : Monitoring Well 2
 วิธีการเก็บตัวอย่าง : Grab
 วันที่เก็บตัวอย่าง : 6/5/2025
 วันที่รับตัวอย่าง : 6/5/2025
 วันที่วิเคราะห์ : 6-13/05/2025
 ชนิดตัวอย่าง : น้ำใต้ดิน

พารามิเตอร์ที่ทดสอบ	หน่วย	วิธีทดสอบ	ผลการทดสอบ	Standard*
Temperature	° C	Laboratory and Field Method	29.7	-
Total Suspended Solids	mg/L	Dried at 103-105 °C	4	-
Total Dissolved Solids	mg/L	Dried at 180 °C	1335	-
COD	mgO ₂ /L	Closed Reflux, Colorimetric Method	< 5	-
BOD	mg/L	5 -Day BOD Test, Azide Modification Method	0.3	-

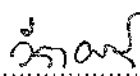
ลักษณะตัวอย่าง : ไม่มีสี ความขุ่นน้อย ตะกอนขนาดเล็ก แขนวลอย ไม่มีกลิ่น

หมายเหตุ : วิเคราะห์ตามมาตรฐาน Standard Methods for the Examination of Water and Wastewater ,
23rd Edition, 2017 ออกโดย APHA - AWWA - WEF.

: * ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 20 พ.ศ. 2543 มาตรฐานคุณภาพน้ำใต้ดิน

ผู้เก็บตัวอย่าง : นางสาวชนิกานต์ แสงสุข



อนุมัติโดย : 

(นางวีราภรณ์ ผลเจริญ)

Lab Manager

รายงานฉบับนี้รับรองเฉพาะตัวอย่างที่ได้ทำการทดสอบเท่านั้น ห้ามนำไปคัดลอกหรือรายงานผลเพียงบางส่วน โดยไม่ได้รับอนุญาตจากห้องปฏิบัติการเป็นลายลักษณ์อักษร

รายงานผลการทดสอบคุณภาพน้ำ

รายงานเลขที่ : 2025/05/166
 ชื่อลูกค้า : บริษัท ดับเบิล เอ (1991) จำกัด (มหาชน)
 ที่อยู่ : 1 หมู่ 2 ต. ท่าตูม อ. ศรีมหาโพธิ จ. ปราจีนบุรี 25140
 ตัวอย่างเลขที่ : 2025/05/166
 เวลาเก็บตัวอย่าง : 15.15 น.
 สถานที่เก็บตัวอย่าง : Monitoring Well 2
 วิธีการเก็บตัวอย่าง : Grab
 วันที่เก็บตัวอย่าง : 6/5/2025
 วันที่รับตัวอย่าง : 6/5/2025
 วันที่วิเคราะห์ : 6-13/05/2025
 ชนิดตัวอย่าง : น้ำใต้ดิน

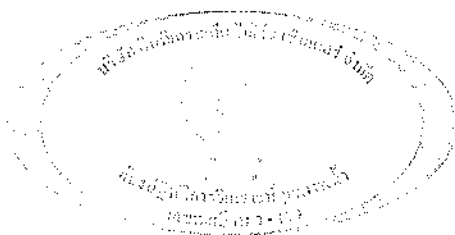
พารามิเตอร์ที่ทดสอบ	หน่วย	วิธีทดสอบ	ผลการทดสอบ	Standard*
pH	-	Electrometric Method	6.6	-
Cadmium	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.002	≤ 0.003
Copper	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.006	≤ 1.0
Nickel	mg/L	Digestion, Inductively Coupled Plasma Method	0.026	≤ 0.02
Lead	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.010	≤ 0.01
Zinc	mg/L	Digestion, Inductively Coupled Plasma Method	0.010	≤ 5.0
Manganese	mg/L	Digestion, Inductively Coupled Plasma Method	0.111	≤ 0.5
Arsenic	mg/L	Digestion, Inductively Coupled Plasma Method	0.007	≤ 0.01
Hexavalent Chromium	mg/L	Filtration, Colorimetric Method	0.088	≤ 0.05

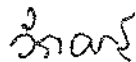
ลักษณะตัวอย่าง : ไม่มีสี ความขุ่นน้อย ตะกอนขนาดเล็ก แว่นลอย ไม่มีกลิ่น

หมายเหตุ : วิธีวิเคราะห์ตามมาตรฐาน Standard Methods for the Examination of Water and Wastewater ,
 23rd Edition, 2017 ออกโดย APHA - AWWA - WEF.

* ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 20 พ.ศ. 2543 มาตรฐานคุณภาพน้ำใต้ดิน

ผู้เก็บตัวอย่าง : นางสาวชนิกานต์ แสนสุข (ว-199-จ-0007)



อนุมัติโดย : 

(นางวีราภรณ์ ผลเจริญ)

ว-199-ค-0003

รายงานฉบับนี้รับรองเฉพาะตัวอย่างที่ได้ทำการทดสอบเท่านั้น ห้ามนำไปคัดลอกหรือรายงานผลเพียงบางส่วน โดยไม่ได้รับอนุญาตจากห้องปฏิบัติการเป็นลายลักษณ์อักษร

รายงานผลการทดสอบคุณภาพน้ำ

รายงานเลขที่ : 2025/05/167
 ชื่อลูกค้า : บริษัท ดับเบิล เอ (1991) จำกัด (มหาชน)
 ที่อยู่ : 1 หมู่ 2 ต. ท่าตูม อ. ศรีมหาโพธิ จ. ปราจีนบุรี 25140
 ตัวอย่างเลขที่ : 2025/05/167
 เวลาเก็บตัวอย่าง : 15.00 น.
 สถานที่เก็บตัวอย่าง : Monitoring Well 3
 วิธีการเก็บตัวอย่าง : Grab
 วันที่เก็บตัวอย่าง : 6/5/2025
 วันที่รับตัวอย่าง : 6/5/2025
 วันที่วิเคราะห์ : 6-13/05/2025
 ชนิดตัวอย่าง : น้ำใต้ดิน

พารามิเตอร์ที่ทดสอบ	หน่วย	วิธีทดสอบ	ผลการทดสอบ	Standard*
Temperature	° C	Laboratory and Field Method	31.4	-
Total Suspended Solids	mg/L	Dried at 103-105 °C	20	-
Total Dissolved Solids	mg/L	Dried at 180 °C	1369	-
COD	mgO ₂ /L	Closed Reflux, Colorimetric Method	13	-
BOD	mg/L	5 -Day BOD Test, Azide Modification Method	0.5	-

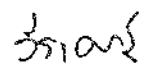
ลักษณะตัวอย่าง : สีเหลือง ความขุ่นน้อย ตะกอนขนาดเล็ก แว่นลอย ไม่มีกลิ่น

หมายเหตุ : วิเคราะห์ตามมาตรฐาน Standard Methods for the Examination of Water and Wastewater ,
23rd Edition, 2017 ออกโดย APHA - AWWA - WEF.

: * ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 20 พ.ศ. 2543 มาตรฐานคุณภาพน้ำใต้ดิน

ผู้เก็บตัวอย่าง : นางสาวชนิกานต์ แสงสุข



อนุมัติโดย : 

(นางวีราภรณ์ ผลเจริญ)

Lab Manager

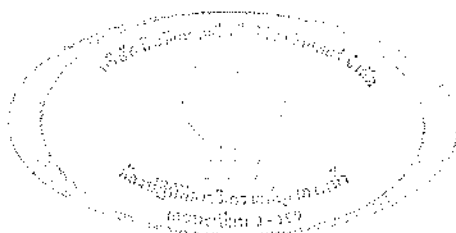
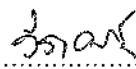
รายงานฉบับนี้รับรองเฉพาะตัวอย่างที่ได้ทำการทดสอบเท่านั้น ห้ามนำไปคัดลอกหรือรายงานผลเพียงบางส่วน โดยไม่ได้รับอนุญาตจากห้องปฏิบัติการเป็นลายลักษณ์อักษร

รายงานผลการทดสอบคุณภาพน้ำ

รายงานเลขที่ : 2025/05/167
 ชื่อลูกค้า : บริษัท ดับเบิล เอ (1991) จำกัด (มหาชน)
 ที่อยู่ : 1 หมู่ 2 ต. ท่าตูม อ. ศรีมหาโพธิ จ. ปราจีนบุรี 25140
 ตัวอย่างเลขที่ : 2025/05/167
 เวลาเก็บตัวอย่าง : 15.00 น.
 สถานที่เก็บตัวอย่าง : Monitoring Well 3
 วิธีการเก็บตัวอย่าง : Grab
 วันที่เก็บตัวอย่าง : 6/5/2025
 วันที่รับตัวอย่าง : 6/5/2025
 วันที่วิเคราะห์ : 6-13/05/2025
 ชนิดตัวอย่าง : น้ำใต้ดิน

พารามิเตอร์ที่ทดสอบ	หน่วย	วิธีทดสอบ	ผลการทดสอบ	Standard*
pH	-	Electrometric Method	6.8	-
Cadmium	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.002	≤ 0.003
Copper	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.006	≤ 1.0
Nickel	mg/L	Digestion, Inductively Coupled Plasma Method	0.025	≤ 0.02
Lead	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.010	≤ 0.01
Zinc	mg/L	Digestion, Inductively Coupled Plasma Method	0.008	≤ 5.0
Manganese	mg/L	Digestion, Inductively Coupled Plasma Method	0.225	≤ 0.5
Arsenic	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.006	≤ 0.01
Hexavalent Chromium	mg/L	Filtration, Colorimetric Method	< 0.025	≤ 0.05

ลักษณะตัวอย่าง : สีเหลือง ความขุ่นน้อย ตะกอนขนาดเล็ก แว่นลอย ไม่มีกลิ่น
หมายเหตุ : วิธีวิเคราะห์ตามมาตรฐาน Standard Methods for the Examination of Water and Wastewater ,
 23rd Edition, 2017 ออกโดย APHA - AWWA - WEF.
 : * ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 20 พ.ศ. 2543 มาตรฐานคุณภาพน้ำใต้ดิน
ผู้เก็บตัวอย่าง : นางสาวชนิกานต์ แสนสุข (ว-199-จ-0007)


 อนุมัติโดย : 

(นางวีราภรณ์ ผลเจริญ)

ว-199-ค-0003

รายงานฉบับนี้รับรองเฉพาะตัวอย่างที่ได้ทำการทดสอบเท่านั้น ห้ามนำไปคัดลอกหรือรายงานผลเพียงบางส่วน โดยไม่ได้รับอนุญาตจากห้องปฏิบัติการเป็นลายลักษณ์อักษร

รายงานผลการทดสอบคุณภาพน้ำ

รายงานเลขที่ : 2025/05/168
 ชื่อลูกค้า : บริษัท ดับเบิล เอ (1991) จำกัด (มหาชน)
 ที่อยู่ : 1 หมู่ 2 ต. ท่าตูม อ. ศรีมหาโพธิ จ. ปราจีนบุรี 25140
 ตัวอย่างเลขที่ : 2025/05/168
 เวลาเก็บตัวอย่าง : 14.40 น.
 สถานที่เก็บตัวอย่าง : Monitoring Well 4
 วิธีการเก็บตัวอย่าง : Grab
 วันที่เก็บตัวอย่าง : 6/5/2025
 วันที่รับตัวอย่าง : 6/5/2025
 วันที่วิเคราะห์ : 6-13/05/2025
 ชนิดตัวอย่าง : น้ำใต้ดิน

พารามิเตอร์ที่ทดสอบ	หน่วย	วิธีทดสอบ	ผลการทดสอบ	Standard*
Temperature	° C	Laboratory and Field Method	32.1	-
Total Suspended Solids	mg/L	Dried at 103-105 °C	65	-
Total Dissolved Solids	mg/L	Dried at 180 °C	1426	-
COD	mgO ₂ /L	Closed Reflux, Colorimetric Method	17	-
BOD	mg/L	5 -Day BOD Test, Azide Modification Method	0.8	-

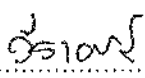
ลักษณะตัวอย่าง : สีเหลือง ความขุ่นปานกลาง ตะกอนขนาดเล็ก แฉวนลอย ไม่มีกลิ่น

หมายเหตุ : วิธีวิเคราะห์ตามมาตรฐาน Standard Methods for the Examination of Water and Wastewater ,
23rd Edition, 2017 ออกโดย APHA - AWWA - WEF.

: * ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 20 พ.ศ. 2543 มาตรฐานคุณภาพน้ำใต้ดิน

ผู้เก็บตัวอย่าง : นางสาวชนิกานต์ แสนสุข



อนุมัติโดย : 

(นางวีราภรณ์ ผลเจริญ)

Lab Manager

รายงานฉบับนี้รับรองเฉพาะตัวอย่างที่ได้ทำการทดสอบเท่านั้น ห้ามนำไปคัดลอกหรือรายงานผลเพียงบางส่วน โดยไม่ได้รับอนุญาตจากห้องปฏิบัติการเป็นลายลักษณ์อักษร

รายงานผลการทดสอบคุณภาพน้ำ

รายงานเลขที่ : 2025/05/168
 ชื่อลูกค้า : บริษัท ดีบีแอล เอ (1991) จำกัด (มหาชน)
 ที่อยู่ : 1 หมู่ 2 ต. ท่าตูม อ. ศรีมหาโพธิ จ. ปราจีนบุรี 25140
 ตัวอย่างเลขที่ : 2025/05/168
 เวลาเก็บตัวอย่าง : 14.40 น.
 สถานที่เก็บตัวอย่าง : Monitoring Well 4
 วิธีการเก็บตัวอย่าง : Grab
 วันที่เก็บตัวอย่าง : 6/5/2025
 วันที่รับตัวอย่าง : 6/5/2025
 วันที่วิเคราะห์ : 6-13/05/2025
 ชนิดตัวอย่าง : น้ำใต้ดิน

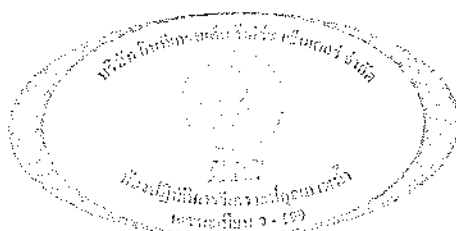
พารามิเตอร์ที่ทดสอบ	หน่วย	วิธีทดสอบ	ผลการทดสอบ	Standard*
pH	-	Electrometric Method	6.8	-
Cadmium	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.002	≤ 0.003
Copper	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.006	≤ 1.0
Nickel	mg/L	Digestion, Inductively Coupled Plasma Method	0.024	≤ 0.02
Lead	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.010	≤ 0.01
Zinc	mg/L	Digestion, Inductively Coupled Plasma Method	0.009	≤ 5.0
Manganese	mg/L	Digestion, Inductively Coupled Plasma Method	0.472	≤ 0.5
Arsenic	mg/L	Digestion, Inductively Coupled Plasma Method	0.010	≤ 0.01
Hexavalent Chromium	mg/L	Filtration, Colorimetric Method	0.060	≤ 0.05

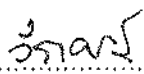
ลักษณะตัวอย่าง : สีเหลือง ความขุ่นปานกลาง ตะกอนขนาดเล็ก แวนลอย ไม่มีกลิ่น

หมายเหตุ : วิเคราะห์ตามมาตรฐาน Standard Methods for the Examination of Water and Wastewater ,
 23rd Edition, 2017 ออกโดย APHA - AWWA - WEF.

: * ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 20 พ.ศ. 2543 มาตรฐานคุณภาพน้ำใต้ดิน

ผู้เก็บตัวอย่าง : นางสาวชนิกานต์ แสนสุข (ว-199-จ-0007)



อนุมัติโดย : 

(นางวีราภรณ์ ผลเจริญ)

ว-199-ค-0003

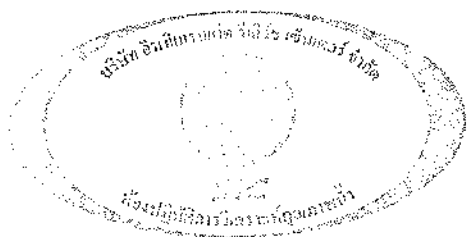
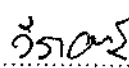
รายงานฉบับนี้รับรองเฉพาะตัวอย่างที่ได้ทำการทดสอบเท่านั้น ห้ามนำไปคัดลอกหรือรายงานผลเพียงบางส่วน โดยไม่ได้รับอนุญาตจากห้องปฏิบัติการเป็นลายลักษณ์อักษร

รายงานผลการทดสอบคุณภาพน้ำ

รายงานเลขที่ : 2025/06/150
 ชื่อลูกค้า : บริษัท ดับเบิล เอ (1991) จำกัด (มหาชน)
 ที่อยู่ : 1 หมู่ 2 ต. ท่าตูม อ. ศรีมหาโพธิ จ. ปราจีนบุรี 25140
 ตัวอย่างเลขที่ : 2025/06/150
 เวลาเก็บตัวอย่าง : 10.00 น.
 สถานที่เก็บตัวอย่าง : Monitoring Well 1
 วิธีการเก็บตัวอย่าง : Grab
 วันที่เก็บตัวอย่าง : 6/6/2025
 วันที่รับตัวอย่าง : 6/6/2025
 วันที่วิเคราะห์ : 6-13/06/2025
 ชนิดตัวอย่าง : น้ำใต้ดิน

พารามิเตอร์ที่ทดสอบ	หน่วย	วิธีทดสอบ	ผลการทดสอบ	Standard*
Temperature	° C	Laboratory and Field Method	30.1	-
Total Suspended Solids	mg/L	Dried at 103-105 °C	70	-
Total Dissolved Solids	mg/L	Dried at 180 °C	2370	-
COD	mgO ₂ /L	Closed Reflux, Colorimetric Method	24	-
BOD	mg/L	5 -Day BOD Test, Azide Modification Method	0.2	-

ลักษณะตัวอย่าง : สีเหลือง ความขุ่นน้อย ตะกอนขนาดเล็ก แขนวนลอย ไม่มีกลิ่น
หมายเหตุ : วิเคราะห์ตามมาตรฐาน Standard Methods for the Examination of Water and Wastewater ,
 23rd Edition, 2017 ออกโดย APHA - AWWA - WEF.
 * ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 20 พ.ศ. 2543 มาตรฐานคุณภาพน้ำใต้ดิน
ผู้เก็บตัวอย่าง : นางสาวชนิกานต์ แสงสุข


 อนุมัติโดย : 

(นางวีราภรณ์ ผลเจริญ)

Lab Manager

รายงานฉบับนี้รับรองเฉพาะตัวอย่างที่ได้ทำการทดสอบเท่านั้น ห้ามนำไปคัดลอกหรือรายงานผลเพียงบางส่วน โดยไม่ได้รับอนุญาตจากห้องปฏิบัติการเป็นลายลักษณ์อักษร

รายงานผลการทดสอบคุณภาพน้ำ

รายงานเลขที่ : 2025/06/150
 ชื่อลูกค้า : บริษัท ดับเบิล เอ (1991) จำกัด (มหาชน)
 ที่อยู่ : 1 หมู่ 2 ต. ท่าตูม อ. ศรีมหาโพธิ จ. ปราจีนบุรี 25140
 ตัวอย่างเลขที่ : 2025/06/150
 เวลาเก็บตัวอย่าง : 10.00 น.
 สถานที่เก็บตัวอย่าง : Monitoring Well 1
 วิธีการเก็บตัวอย่าง : Grab
 วันที่เก็บตัวอย่าง : 6/6/2025
 วันที่รับตัวอย่าง : 6/6/2025
 วันที่วิเคราะห์ : 6-13/06/2025
 ชนิดตัวอย่าง : น้ำใต้ดิน

พารามิเตอร์ที่ทดสอบ	หน่วย	วิธีทดสอบ	ผลการทดสอบ	Standard*
pH	-	Electrometric Method	6.1	-
Cadmium	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.002	≤ 0.003
Copper	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.006	≤ 1.0
Nickel	mg/L	Digestion, Inductively Coupled Plasma Method	0.023	≤ 0.02
Lead	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.010	≤ 0.01
Zinc	mg/L	Digestion, Inductively Coupled Plasma Method	0.020	≤ 5.0
Manganese	mg/L	Digestion, Inductively Coupled Plasma Method	1.569	≤ 0.5
Arsenic	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.006	≤ 0.01
Hexavalent Chromium	mg/L	Filtration, Colorimetric Method	< 0.025	≤ 0.05

ลักษณะตัวอย่าง : สีเหลือง ความขุ่นน้อย ตะกอนขนาดเล็ก แว่นลอย ไม่มีกลิ่น
หมายเหตุ : วิเคราะห์ตามมาตรฐาน Standard Methods for the Examination of Water and Wastewater ,
 23rd Edition, 2017 ออกโดย APHA - AWWA - WEF.
 : * ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 20 พ.ศ. 2543 มาตรฐานคุณภาพน้ำใต้ดิน
ผู้เก็บตัวอย่าง : นางสาวชนนิกานต์ แสนสุข (ว-199-จ-0007)


 อนุมัติโดย : วิภากร

(นางวิภากรณ์ ผลเจริญ)

ว-199-ค-0003

รายงานฉบับนี้รับรองเฉพาะตัวอย่างที่ได้ทำการทดสอบเท่านั้น ห้ามนำไปคัดลอกหรือรายงานผลเพียงบางส่วน โดยไม่ได้รับอนุญาตจากห้องปฏิบัติการเป็นลายลักษณ์อักษร

122 หมู่ 2 ต.ท่าตูม อ.ศรีมหาโพธิ จ.ปราจีนบุรี 25140 โทร 02-6345230 ต่อ 3311

ฉบับที่ : 1 (แก้ไขครั้งที่ : 0)

หน้า 2 ของ 2

รายงานผลการทดสอบคุณภาพน้ำ

รายงานเลขที่ : 2025/06/151
 ชื่อลูกค้า : บริษัท ดีบีแอล เอ (1991) จำกัด (มหาชน)
 ที่อยู่ : 1 หมู่ 2 ต. ท่าตูม อ. ศรีมหาโพธิ จ. ปราจีนบุรี 25140
 ตัวอย่างเลขที่ : 2025/06/151
 เวลาเก็บตัวอย่าง : 10.15 น.
 สถานที่เก็บตัวอย่าง : Monitoring Well 2
 วิธีการเก็บตัวอย่าง : Grab
 วันที่เก็บตัวอย่าง : 6/6/2025
 วันที่รับตัวอย่าง : 6/6/2025
 วันที่วิเคราะห์ : 6-13/06/2025
 ชนิดตัวอย่าง : น้ำใต้ดิน

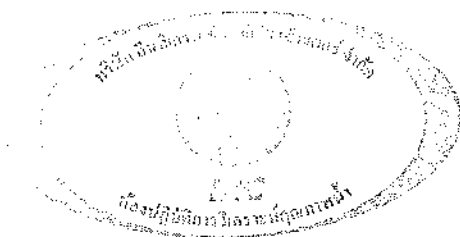
พารามิเตอร์ที่ทดสอบ	หน่วย	วิธีทดสอบ	ผลการทดสอบ	Standard*
Temperature	° C	Laboratory and Field Method	30.9	-
Total Suspended Solids	mg/L	Dried at 103-105 °C	3	-
Total Dissolved Solids	mg/L	Dried at 180 °C	1954	-
COD	mgO ₂ /L	Closed Reflux, Colorimetric Method	15	-
BOD	mg/L	5 -Day BOD Test, Azide Modification Method	0.3	-

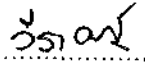
ลักษณะตัวอย่าง : สีเหลือง ความขุ่นปานกลาง ตะกอนขนาดเล็ก แฉวนลอย ไม่มีกลิ่น

หมายเหตุ : วิเคราะห์ตามมาตรฐาน Standard Methods for the Examination of Water and Wastewater , 23rd Edition, 2017 ออกโดย APHA - AWWA - WEF.

* ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 20 พ.ศ. 2543 มาตรฐานคุณภาพน้ำใต้ดิน

ผู้เก็บตัวอย่าง : นางสาวชนนิกานต์ แสนสุข



อนุมัติโดย : 

(นางวีราภรณ์ ผลเจริญ)

Lab Manager

รายงานฉบับนี้รับรองเฉพาะตัวอย่างที่ได้ทำการทดสอบเท่านั้น ห้ามนำไปคัดลอกหรือรายงานผลเพียงบางส่วน โดยไม่ได้รับอนุญาตจากห้องปฏิบัติการเป็นลายลักษณ์อักษร

รายงานผลการทดสอบคุณภาพน้ำ

รายงานเลขที่ : 2025/06/151
 ชื่อลูกค้า : บริษัท ดีบีเอ็ม เอ (1991) จำกัด (มหาชน)
 ที่อยู่ : 1 หมู่ 2 ต. ท่าตูม อ. ศรีมหาโพธิ จ. ปราจีนบุรี 25140
 ตัวอย่างเลขที่ : 2025/06/151
 เวลาเก็บตัวอย่าง : 10.15 น.
 สถานที่เก็บตัวอย่าง : Monitoring Well 2
 วิธีการเก็บตัวอย่าง : Grab
 วันที่เก็บตัวอย่าง : 6/6/2025
 วันที่รับตัวอย่าง : 6/6/2025
 วันที่วิเคราะห์ : 6-13/06/2025
 ชนิดตัวอย่าง : น้ำใต้ดิน

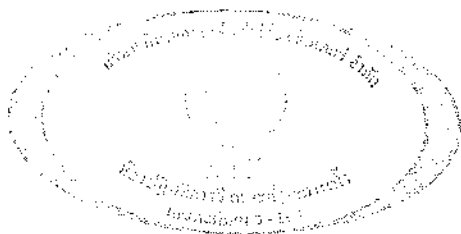
พารามิเตอร์ที่ทดสอบ	หน่วย	วิธีทดสอบ	ผลการทดสอบ	Standard*
pH	-	Electrometric Method	6.3	-
Cadmium	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.002	≤ 0.003
Copper	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.006	≤ 1.0
Nickel	mg/L	Digestion, Inductively Coupled Plasma Method	0.024	≤ 0.02
Lead	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.010	≤ 0.01
Zinc	mg/L	Digestion, Inductively Coupled Plasma Method	0.016	≤ 5.0
Manganese	mg/L	Digestion, Inductively Coupled Plasma Method	0.079	≤ 0.5
Arsenic	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.006	≤ 0.01
Hexavalent Chromium	mg/L	Filtration, Colorimetric Method	< 0.025	≤ 0.05

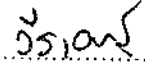
ลักษณะตัวอย่าง : สีเหลือง ความขุ่นปานกลาง ตะกอนขนาดเล็ก แฉวนลอย ไม่มีกลิ่น

หมายเหตุ : วิธีวิเคราะห์ตามมาตรฐาน Standard Methods for the Examination of Water and Wastewater ,
23rd Edition, 2017 ออกโดย APHA - AWWA - WEF.

* ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 20 พ.ศ. 2543 มาตรฐานคุณภาพน้ำใต้ดิน

ผู้เก็บตัวอย่าง : นางสาวชนิกานต์ แสนสุข (ว-199-จ-0007)



อนุมัติโดย : 

(นางวีราภรณ์ ผลเจริญ)

ว-199-ค-0003

รายงานฉบับนี้รับรองเฉพาะตัวอย่างที่ได้ทำการทดสอบเท่านั้น ห้ามนำไปคัดลอกหรือรายงานผลเพียงบางส่วน โดยไม่ได้รับอนุญาตจากห้องปฏิบัติการเป็นลายลักษณ์อักษร

รายงานผลการทดสอบคุณภาพน้ำ

รายงานเลขที่ : 2025/06/152
 ชื่อลูกค้า : บริษัท ดีบีแอล เอ (1991) จำกัด (มหาชน)
 ที่อยู่ : 1 หมู่ 2 ต. ท่าตูม อ. ศรีมหาโพธิ จ. ปราจีนบุรี 25140
 ตัวอย่างเลขที่ : 2025/06/152
 เวลาเก็บตัวอย่าง : 09.50 น.
 สถานที่เก็บตัวอย่าง : Monitoring Well 3
 วิธีการเก็บตัวอย่าง : Grab
 วันที่เก็บตัวอย่าง : 6/6/2025
 วันที่รับตัวอย่าง : 6/6/2025
 วันที่วิเคราะห์ : 6-13/06/2025
 ชนิดตัวอย่าง : น้ำใต้ดิน

พารามิเตอร์ที่ทดสอบ	หน่วย	วิธีทดสอบ	ผลการทดสอบ	Standard*
Temperature	° C	Laboratory and Field Method	30.8	-
Total Suspended Solids	mg/L	Dried at 103-105 °C	18	-
Total Dissolved Solids	mg/L	Dried at 180 °C	1950	-
COD	mgO ₂ /L	Closed Reflux, Colorimetric Method	11	-
BOD	mg/L	5-Day BOD Test, Azide Modification Method	1.0	-

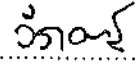
ลักษณะตัวอย่าง : สีเหลือง ความขุ่นปานกลาง ตะกอนขนาดเล็ก แขนวนลอย ไม่มีกลิ่น

หมายเหตุ : วิเคราะห์ตามมาตรฐาน Standard Methods for the Examination of Water and Wastewater , 23rd Edition, 2017 ออกโดย APHA - AWWA - WEF.

* ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 20 พ.ศ. 2543 มาตรฐานคุณภาพน้ำใต้ดิน

ผู้เก็บตัวอย่าง : นางสาวชนนิกานต์ แสนสุข



อนุมัติโดย : 

(นางวีราภรณ์ ผลเจริญ)

Lab Manager

รายงานฉบับนี้รับรองเฉพาะตัวอย่างที่ได้ทำการทดสอบเท่านั้น ห้ามนำไปคัดลอกหรือรายงานผลเพียงบางส่วน โดยไม่ได้รับอนุญาตจากห้องปฏิบัติการเป็นลายลักษณ์อักษร

รายงานผลการทดสอบคุณภาพน้ำ

รายงานเลขที่ : 2025/06/152
 ชื่อลูกค้า : บริษัท ดีบีแอล เอ (1991) จำกัด (มหาชน)
 ที่อยู่ : 1 หมู่ 2 ต. ท่าตูม อ. ศรีมหาโพธิ จ. ปราจีนบุรี 25140
 ตัวอย่างเลขที่ : 2025/06/152
 เวลาเก็บตัวอย่าง : 09.50 น.
 สถานที่เก็บตัวอย่าง : Monitoring Well 3
 วิธีการเก็บตัวอย่าง : Grab
 วันที่เก็บตัวอย่าง : 6/6/2025
 วันที่รับตัวอย่าง : 6/6/2025
 วันที่วิเคราะห์ : 6-13/06/2025
 ชนิดตัวอย่าง : น้ำใต้ดิน

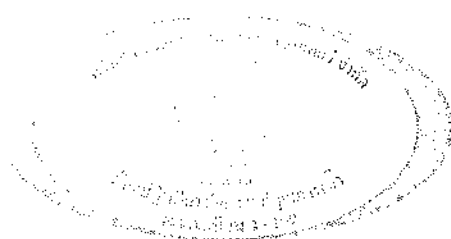
พารามิเตอร์ที่ทดสอบ	หน่วย	วิธีทดสอบ	ผลการทดสอบ	Standard*
pH	-	Electrometric Method	6.6	-
Cadmium	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.002	≤ 0.003
Copper	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.006	≤ 1.0
Nickel	mg/L	Digestion, Inductively Coupled Plasma Method	0.023	≤ 0.02
Lead	mg/L	Digestion, Inductively Coupled Plasma Method	0.016	≤ 0.01
Zinc	mg/L	Digestion, Inductively Coupled Plasma Method	0.015	≤ 5.0
Manganese	mg/L	Digestion, Inductively Coupled Plasma Method	0.206	≤ 0.5
Arsenic	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.006	≤ 0.01
Hexavalent Chromium	mg/L	Filtration, Colorimetric Method	< 0.025	≤ 0.05

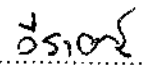
ลักษณะตัวอย่าง : สีเหลือง ความขุ่นปานกลาง ตะกอนขนาดเล็ก แฉวนลอย ไม่มีกลิ่น

หมายเหตุ : วิเคราะห์ตามมาตรฐาน Standard Methods for the Examination of Water and Wastewater ,
23rd Edition, 2017 ออกโดย APHA - AWWA - WEF.

* ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 20 พ.ศ. 2543 มาตรฐานคุณภาพน้ำใต้ดิน

ผู้เก็บตัวอย่าง : นางสาวชนิกานต์ แสนสุข (ว-199-จ-0007)



อนุมัติโดย : 

(นางวีราภรณ์ ผลเจริญ)

ว-199-ค-0003

รายงานฉบับนี้รับรองเฉพาะตัวอย่างที่ได้ทำการทดสอบเท่านั้น ห้ามนำไปคัดลอกหรือรายงานผลเพียงบางส่วน โดยไม่ได้รับอนุญาตจากห้องปฏิบัติการเป็นลายลักษณ์อักษร

รายงานผลการทดสอบคุณภาพน้ำ

รายงานเลขที่ : 2025/06/153
 ชื่อลูกค้า : บริษัท ดับเบิล เอ (1991) จำกัด (มหาชน)
 ที่อยู่ : 1 หมู่ 2 ต. ท่าตูม อ. ศรีมหาโพธิ จ. ปราจีนบุรี 25140
 ตัวอย่างเลขที่ : 2025/06/153
 เวลาเก็บตัวอย่าง : 09.25 น.
 สถานที่เก็บตัวอย่าง : Monitoring Well 4
 วิธีการเก็บตัวอย่าง : Grab

วันที่เก็บตัวอย่าง : 6/6/2025
 วันที่รับตัวอย่าง : 6/6/2025
 วันที่วิเคราะห์ : 6-13/06/2025
 ชนิดตัวอย่าง : น้ำใต้ดิน

พารามิเตอร์ที่ทดสอบ	หน่วย	วิธีทดสอบ	ผลการทดสอบ	Standard*
Temperature	° C	Laboratory and Field Method	31.2	-
Total Suspended Solids	mg/L	Dried at 103-105 °C	100	-
Total Dissolved Solids	mg/L	Dried at 180 °C	1151	-
COD	mgO ₂ /L	Closed Reflux, Colorimetric Method	10	-
BOD	mg/L	5 -Day BOD Test, Azide Modification Method	1.0	-

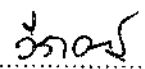
ลักษณะตัวอย่าง : สีเหลือง ความขุ่นปานกลาง ตะกอนขนาดเล็ก แหวนลอย ไม่มีกลิ่น

หมายเหตุ : วิเคราะห์ตามมาตรฐาน Standard Methods for the Examination of Water and Wastewater ,
 23rd Edition, 2017 ออกโดย APHA - AWWA - WEF.

* ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 20 พ.ศ. 2543 มาตรฐานคุณภาพน้ำใต้ดิน

ผู้เก็บตัวอย่าง : นางสาวชนิกานต์ แสนสุข



อนุมัติโดย : 

(นางวีราภรณ์ ผลเจริญ)

Lab Manager

รายงานฉบับนี้รับรองเฉพาะตัวอย่างที่ได้ทำการทดสอบเท่านั้น ห้ามนำไปตีตลาดหรือรายงานผลเพียงบางส่วน โดยไม่ได้รับอนุญาตจากห้องปฏิบัติการเป็นลายลักษณ์อักษร

รายงานผลการทดสอบคุณภาพน้ำ

รายงานเลขที่ : 2025/06/153
 ชื่อลูกค้า : บริษัท ดับเบิล เอ (1991) จำกัด (มหาชน)
 ที่อยู่ : 1 หมู่ 2 ต. ท่าตูม อ. ศรีมหาโพธิ จ. ปราจีนบุรี 25140
 ตัวอย่างเลขที่ : 2025/06/153
 เวลาเก็บตัวอย่าง : 09.25 น.
 สถานที่เก็บตัวอย่าง : Monitoring Well 4
 วิธีการเก็บตัวอย่าง : Grab

วันที่เก็บตัวอย่าง : 6/6/2025
 วันที่รับตัวอย่าง : 6/6/2025
 วันที่วิเคราะห์ : 6-13/06/2025
 ชนิดตัวอย่าง : น้ำใต้ดิน

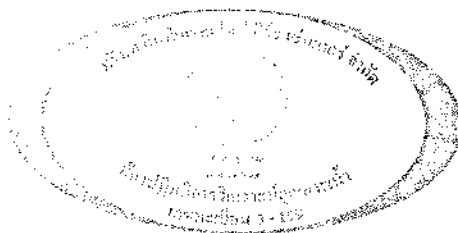
พารามิเตอร์ที่ทดสอบ	หน่วย	วิธีทดสอบ	ผลการทดสอบ	Standard*
pH	-	Electrometric Method	6.9	-
Cadmium	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.002	≤ 0.003
Copper	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.006	≤ 1.0
Nickel	mg/L	Digestion, Inductively Coupled Plasma Method	0.012	≤ 0.02
Lead	mg/L	Digestion, Inductively Coupled Plasma Method	0.010	≤ 0.01
Zinc	mg/L	Digestion, Inductively Coupled Plasma Method	0.017	≤ 5.0
Manganese	mg/L	Digestion, Inductively Coupled Plasma Method	0.184	≤ 0.5
Arsenic	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.006	≤ 0.01
Hexavalent Chromium	mg/L	Filtration, Colorimetric Method	< 0.025	≤ 0.05

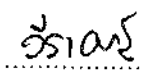
ลักษณะตัวอย่าง : สีเหลือง ความขุ่นปานกลาง ตะกอนขนาดเล็ก แว่นลอย ไม่มีกลิ่น

หมายเหตุ : วิเคราะห์ตามมาตรฐาน Standard Methods for the Examination of Water and Wastewater ,
 23rd Edition, 2017 ออกโดย APHA - AWWA - WEF.

: * ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 20 พ.ศ. 2543 มาตรฐานคุณภาพน้ำใต้ดิน

ผู้เก็บตัวอย่าง : นางสาวชนิกานต์ แสนสุข (ว-199-จ-0007)



อนุมัติโดย : 

(นางวีราภรณ์ ผลเจริญ)

ว-199-ค-0003

รายงานฉบับนี้รับรองเฉพาะตัวอย่างที่ได้ทำการทดสอบเท่านั้น ห้ามนำไปตีตลาดหรือรายงานผลเพียงบางส่วน โดยไม่ได้รับอนุญาตจากห้องปฏิบัติการเป็นลายลักษณ์อักษร

รายงานผลการทดสอบคุณภาพน้ำ

รายงานเลขที่ : 2025/06/154
 ชื่อลูกค้า : บริษัท ดับเบิ้ล เอ (1991) จำกัด (มหาชน)
 ที่อยู่ : 1 หมู่ 2 ต. ท่าตูม อ. ศรีมหาโพธิ จ. ปราจีนบุรี 25140
 ตัวอย่างเลขที่ : 2025/06/154
 เวลาเก็บตัวอย่าง : 09.20 น.
 สถานที่เก็บตัวอย่าง : Monitoring Well 5
 วิธีการเก็บตัวอย่าง : Grab

วันที่เก็บตัวอย่าง : 6/6/2025
 วันที่รับตัวอย่าง : 6/6/2025
 วันที่วิเคราะห์ : 6-13/06/2025
 ชนิดตัวอย่าง : น้ำใต้ดิน

พารามิเตอร์ที่ทดสอบ	หน่วย	วิธีทดสอบ	ผลการทดสอบ	Standard*
Temperature	° C	Laboratory and Field Method	30.8	-
Total Suspended Solids	mg/L	Dried at 103-105 °C	27	-
Total Dissolved Solids	mg/L	Dried at 180 °C	2070	-
COD	mgO ₂ /L	Closed Reflux, Colorimetric Method	30	-
BOD	mg/L	5 -Day BOD Test, Azide Modification Method	1.1	-

ลักษณะตัวอย่าง : สีขาว ความขุ่นมาก ตะกอนขนาดเล็ก แขนวนลอย ไม่มีกลิ่น

หมายเหตุ : วิธีวิเคราะห์ตามมาตรฐาน Standard Methods for the Examination of Water and Wastewater ,
 23rd Edition, 2017 ออกโดย APHA - AWWA - WEF.

* ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 20 พ.ศ. 2543 มาตรฐานคุณภาพน้ำใต้ดิน

ผู้เก็บตัวอย่าง : นางสาวชนนิกานต์ แสงสุข



อนุมัติโดย : วิมล

(นางวิภากรณ์ ผลเจริญ)

Lab Manager

รายงานฉบับนี้รับรองเฉพาะตัวอย่างที่ได้ทำการทดสอบเท่านั้น ห้ามนำไปคัดลอกหรือรายงานผลเพียงบางส่วน โดยไม่ได้รับอนุญาตจากห้องปฏิบัติการเป็นลายลักษณ์อักษร

รายงานผลการทดสอบคุณภาพน้ำ

รายงานเลขที่ : 2025/06/154

ชื่อลูกค้า : บริษัท ดับเบิล เอ (1991) จำกัด (มหาชน)

ที่อยู่ : 1 หมู่ 2 ต. ท่าตูม อ. ศรีมหาโพธิ จ. ปราจีนบุรี 25140

ตัวอย่างเลขที่ : 2025/06/154

เวลาเก็บตัวอย่าง : 09.20 น.

สถานที่เก็บตัวอย่าง : Monitoring Well 5

วิธีการเก็บตัวอย่าง : Grab

วันที่เก็บตัวอย่าง : 6/6/2025

วันที่รับตัวอย่าง : 6/6/2025

วันที่วิเคราะห์ : 6-13/06/2025

ชนิดตัวอย่าง : น้ำใต้ดิน

พารามิเตอร์ที่ทดสอบ	หน่วย	วิธีทดสอบ	ผลการทดสอบ	Standard*
pH	-	Electrometric Method	6.5	-
Cadmium	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.002	≤ 0.003
Copper	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.006	≤ 1.0
Nickel	mg/L	Digestion, Inductively Coupled Plasma Method	0.019	≤ 0.02
Lead	mg/L	Digestion, Inductively Coupled Plasma Method	< 0.010	≤ 0.01
Zinc	mg/L	Digestion, Inductively Coupled Plasma Method	0.016	≤ 5.0
Manganese	mg/L	Digestion, Inductively Coupled Plasma Method	0.634	≤ 0.5
Arsenic	mg/L	Digestion, Inductively Coupled Plasma Method	0.010	≤ 0.01
Hexavalent Chromium	mg/L	Filtration, Colorimetric Method	< 0.025	≤ 0.05

ลักษณะตัวอย่าง : สีขาว ความขุ่นมาก ตะกอนขนาดเล็ก แววนลอย ไม่มีกลิ่น

หมายเหตุ : วิเคราะห์ตามมาตรฐาน Standard Methods for the Examination of Water and Wastewater ,
23rd Edition, 2017 ออกโดย APHA - AWWA - WEF.

* ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 20 พ.ศ. 2543 มาตรฐานคุณภาพน้ำใต้ดิน

ผู้เก็บตัวอย่าง : นางสาวชนนิภาณต์ แสนสุข (ว-199-จ-0007)

อนุมัติโดย : 

(นางวีราภรณ์ ผลเจริญ)

ว-199-ค-0003

รายงานฉบับนี้รับรองเฉพาะตัวอย่างที่ได้ทำการทดสอบเท่านั้น ห้ามนำไปคัดลอกหรือรายงานผลเพียงบางส่วน โดยไม่ได้รับอนุญาตจากห้องปฏิบัติการเป็นลายลักษณ์อักษร

122 หมู่ 2 ต.ท่าตูม อ.ศรีมหาโพธิ จ.ปราจีนบุรี 25140 โทร 02-6345230 ต่อ 3311

ฉบับที่ : 1 (แก้ไขครั้งที่ : 0)

หน้า 2 ของ 2

ANALYSIS REPORT

CUSTOMER NAME : DOUBLE A (1991) PUBLIC CO., LTD. (PULP1)
ADDRESS : 1 MOO 2, THATOOM, SRIMAHAPHOTE, PRACHINBURI THAILAND 25140.
CONTACT INFORMATION : TEL : 08 5835 1371 e-mail : kunnapat_p@doublea1991.com
SAMPLING SOURCE : MONITORING WELL #1
SAMPLE TYPE : GROUNDWATER
SAMPLING DATE : JANUARY 7, 2025
SAMPLING TIME : 13:54 HOUR
SAMPLING METHOD ° : SUBMERSIBLE PUMP
SAMPLING BY ° : MR KRIDSANAPONG NAMTHIP
ANALYZED BY : MISS KEWALEE SUKHAREE

RECEIVED DATE : JANUARY 8, 2025
ANALYTICAL DATE : JANUARY 8-14, 2025
ISSUE DATE : JANUARY 18, 2025
REPORT NO. : 2025-U003760
WORK NO. : 2024-009408
ANALYSIS NO. : T25AA213-0001

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD
			MONITORING WELL #1 T25AA213-0001	
COLOUR °	Platinum-Cobalt	VISUAL COMPARISON METHOD (SM: PART 2120 B)	< 5	-
ELECTRICAL CONDUCTIVITY °	µS/cm	ELECTRICAL CONDUCTIVITY METHOD (AT SITE) SM: PART 2510 B AND 1060 B	2,438 (29.1°C)	-
AMMONIA-NITROGEN °	mg/L NH ₃ -N	PHENATE METHOD (SM: PART 4500-NH ₃ F)	1.50	-
CYANIDE °	µg/L CN ⁻	DISTILLATION, PYRIDINE-BARBITURIC ACID METHOD (SM: PART 4500-CN ⁻ C AND PART 4500-CN ⁻ E)	ND	≤ 200
NITRATE-NITROGEN °	mg/L NO ₃ ⁻ -N	CADMIUM REDUCTION METHOD (SM: PART 4500-NO ₃ ⁻ E)	ND	-
PHENOLS °	mg/L	DISTILLATION, 4-AMINOANTIPYRINE METHOD (SM: PART 5530 B AND PART 5530 C)	ND	-
TOTAL PHOSPHATE °	mg/L PO ₄ ³⁻	PERSULPHATE DIGESTION AND ASCORBIC ACID METHOD (SM: PART 4500- P B AND PART 4500-P E)	0.06	-
CHLORIDE °	mg/L Cl ⁻	ARGENTOMETRIC METHOD (SM: PART 4500-Cl ⁻ B)	243	-
SULPHATE °	mg/L SO ₄ ²⁻	TURBIDIMETRIC METHOD (SM: PART 4500- SO ₄ ²⁻ E)	787	-
ALKALINITY °	mg/L CaCO ₃	TITRATION METHOD (SM: PART 2320 B)	166	-

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD
			MONITORING WELL #1 T25AA213-0001	
METALS				
MERCURY ^b	mg/L Hg	IN-HOUSE METHOD: UAE.TP.HEM.002 BASED ON SM: PART 3112 B	ND	≤ 0.001
SODIUM ^c	mg/L Na	NITRIC ACID-HYDROCHLORIC ACID DIGESTION AND INDUCTIVELY COUPLED PLASMA (ICP) METHOD (SM: PART 3030 F AND PART 3120 B)	334	-
SAMPLE CONDITION				
WATER'S COLOUR/TURBID			YELLOW/CLEAR	
SEDIMENT			BROWN	

^a : ISO/IEC 17025 ACCREDITED BY THAI INDUSTRIAL STANDARDS INSTITUTE (TISI)

^b : ISO/IEC 17025 ACCREDITED BY DEPARTMENT OF SCIENCE SERVICE (DSS)

^c : VERIFIED BY OWN LABORATORY QUALITY SYSTEM, BUT STILL NOT ACCREDITED

SM : STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 24th EDITION, 2023.

REGULATORY STANDARD : NOTIFICATION OF THE NATIONAL ENVIRONMENTAL BOARD, NO.20, B.E.2543.

ND : NOT DETECTED (CYANIDE < 5 µg/L, NITRATE-NITROGEN < 0.02 mg/L, PHENOLS < 0.005 mg/L, MERCURY < 0.0001 mg/L).



(MR BHUCHONK PANICHLERTUMPI)

LABORATORY SUPERVISOR

ANALYSIS REPORT

CUSTOMER NAME : DOUBLE A (1991) PUBLIC CO., LTD. (PULP1)
ADDRESS : 1 MOO 2, THATOOM, SRIMAHAPHOTE, PRACHINBURI THAILAND 25140.
CONTACT INFORMATION : TEL : 08 5835 1371 e-mail : kunnapat_p@doublea1991.com
SAMPLING SOURCE : MONITORING WELL #2
SAMPLE TYPE : GROUNDWATER
SAMPLING DATE : JANUARY 7, 2025
SAMPLING TIME : 14:07 HOUR
SAMPLING METHOD ° : SUBMERSIBLE PUMP
SAMPLING BY ° : MR KRIDSANAPONG NAMTHIP
ANALYZED BY : MISS KEWALEE SUKHAREE

RECEIVED DATE : JANUARY 8, 2025
ANALYTICAL DATE : JANUARY 8-14, 2025
ISSUE DATE : JANUARY 18, 2025
REPORT NO. : 2025-U003761
WORK NO. : 2024-009408
ANALYSIS NO. : T25AA213-0002

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD
			MONITORING WELL #2 T25AA213-0002	
COLOUR °	Platinum-Cobalt	VISUAL COMPARISON METHOD (SM: PART 2120 B)	< 5	-
ELECTRICAL CONDUCTIVITY °	µS/cm	ELECTRICAL CONDUCTIVITY METHOD (AT SITE) SM: PART 2510 B AND 1060 B	2,347 (29.1°C)	-
AMMONIA-NITROGEN °	mg/L NH ₃ -N	PHENATE METHOD (SM: PART 4500-NH ₃ F)	2.50	-
CYANIDE °	µg/L CN ⁻	DISTILLATION, PYRIDINE-BARBITURIC ACID METHOD (SM: PART 4500-CN ⁻ C AND PART 4500-CN ⁻ E)	ND	≤ 200
NITRATE-NITROGEN °	mg/L NO ₃ ⁻ -N	CADMIUM REDUCTION METHOD (SM: PART 4500-NO ₃ ⁻ E)	ND	-
PHENOLS °	mg/L	DISTILLATION, 4-AMINOANTIPYRINE METHOD (SM: PART 5530 B AND PART 5530 C)	ND	-
TOTAL PHOSPHATE °	mg/L PO ₄ ³⁻	PERSULPHATE DIGESTION AND ASCORBIC ACID METHOD (SM: PART 4500- P B AND PART 4500-P E)	0.06	-
CHLORIDE °	mg/L Cl ⁻	ARGENTOMETRIC METHOD (SM: PART 4500-Cl ⁻ B)	273	-
SULPHATE °	mg/L SO ₄ ²⁻	TURBIDIMETRIC METHOD (SM: PART 4500- SO ₄ ²⁻ E)	583	-
ALKALINITY °	mg/L CaCO ₃	TITRATION METHOD (SM: PART 2320 B)	208	-

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD
			MONITORING WELL #2 T25AA213-0002	
METALS				
MERCURY ^b	mg/L Hg	IN-HOUSE METHOD: UAE.TP.HEM.002 BASED ON SM: PART 3112 B	ND	≤ 0.001
SODIUM ^c	mg/L Na	NITRIC ACID-HYDROCHLORIC ACID DIGESTION AND INDUCTIVELY COUPLED PLASMA (ICP) METHOD (SM: PART 3030 F AND PART 3120 B)	296	-
SAMPLE CONDITION				
WATER'S COLOUR/TURBID SEDIMENT			YELLOW/CLEAR BROWN	

^a : ISO/IEC 17025 ACCREDITED BY THAI INDUSTRIAL STANDARDS INSTITUTE (TISI)


^b : ISO/IEC 17025 ACCREDITED BY DEPARTMENT OF SCIENCE SERVICE (DSS)

^c : VERIFIED BY OWN LABORATORY QUALITY SYSTEM, BUT STILL NOT ACCREDITED

SM : STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 24th EDITION, 2023.

REGULATORY STANDARD : NOTIFICATION OF THE NATIONAL ENVIRONMENTAL BOARD, NO.20, B.E.2543.

ND : NOT DETECTED (CYANIDE < 5 µg/L, NITRATE-NITROGEN < 0.02 mg/L, PHENOLS < 0.005 mg/L, MERCURY < 0.0001 mg/L).


(MR BHUCHONK PANICHLERTUMPI)
LABORATORY SUPERVISOR

ANALYSIS REPORT

CUSTOMER NAME : DOUBLE A (1991) PUBLIC CO., LTD. (PULP1)
ADDRESS : 1 MOO 2, THATOOM, SRIMAHAPHOTE, PRACHINBURI THAILAND 25140.
CONTACT INFORMATION : TEL : 08 5835 1371 e-mail : kunnapat_p@doublea1991.com
SAMPLING SOURCE : MONITORING WELL #3
SAMPLE TYPE : GROUNDWATER
SAMPLING DATE : JANUARY 7, 2025
SAMPLING TIME : 13:33 HOUR
SAMPLING METHOD ° : SUBMERSIBLE PUMP
SAMPLING BY ° : MR KRIDSANAPONG NAMTHIP
ANALYZED BY : MISS KEWALEE SUKHAREE

RECEIVED DATE : JANUARY 8, 2025
ANALYTICAL DATE : JANUARY 8-14, 2025
ISSUE DATE : JANUARY 18, 2025
REPORT NO. : 2025-U003762
WORK NO. : 2024-009408
ANALYSIS NO. : T25AA213-0003

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD
			MONITORING WELL #3 T25AA213-0003	
COLOUR °	Platinum-Cobalt	VISUAL COMPARISON METHOD (SM: PART 2120 B)	5	-
ELECTRICAL CONDUCTIVITY °	µS/cm	ELECTRICAL CONDUCTIVITY METHOD (AT SITE) SM: PART 2510 B AND 1060 B	1,719 (30.1°C)	-
AMMONIA-NITROGEN °	mg/L NH ₃ -N	PHENATE METHOD (SM: PART 4500-NH ₃ F)	1.88	-
CYANIDE °	µg/L CN ⁻	DISTILLATION, PYRIDINE-BARBITURIC ACID METHOD (SM: PART 4500-CN ⁻ C AND PART 4500-CN ⁻ E)	ND	≤ 200
NITRATE-NITROGEN °	mg/L NO ₃ ⁻ -N	CADMIUM REDUCTION METHOD (SM: PART 4500-NO ₃ ⁻ E)	ND	-
PHENOLS °	mg/L	DISTILLATION, 4-AMINOANTIPYRINE METHOD (SM: PART 5530 B AND PART 5530 C)	ND	-
TOTAL PHOSPHATE °	mg/L PO ₄ ³⁻	PERSULPHATE DIGESTION AND ASCORBIC ACID METHOD (SM: PART 4500- P B AND PART 4500-P E)	0.06	-
CHLORIDE °	mg/L Cl ⁻	ARGENTOMETRIC METHOD (SM: PART 4500-Cl ⁻ B)	278	-
SULPHATE °	mg/L SO ₄ ²⁻	TURBIDIMETRIC METHOD (SM: PART 4500- SO ₄ ²⁻ E)	577	-
ALKALINITY °	mg/L CaCO ₃	TITRATION METHOD (SM: PART 2320 B)	305	-

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD
			MONITORING WELL #3 T25AA213-0003	
METALS				
MERCURY ^b	mg/L Hg	IN-HOUSE METHOD: UAE.TP.HEM.002 BASED ON SM: PART 3112 B	ND	≤ 0.001
SODIUM ^c	mg/L Na	NITRIC ACID-HYDROCHLORIC ACID DIGESTION AND INDUCTIVELY COUPLED PLASMA (ICP) METHOD (SM: PART 3030 F AND PART 3120 B)	284	-
SAMPLE CONDITION				
WATER'S COLOUR/TURBID SEDIMENT			YELLOW/CLEAR BROWN	

^a : ISO/IEC 17025 ACCREDITED BY THAI INDUSTRIAL STANDARDS INSTITUTE (TISI)

^b : ISO/IEC 17025 ACCREDITED BY DEPARTMENT OF SCIENCE SERVICE (DSS)

^c : VERIFIED BY OWN LABORATORY QUALITY SYSTEM, BUT STILL NOT ACCREDITED

SM : STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 24th EDITION, 2023.

REGULATORY STANDARD : NOTIFICATION OF THE NATIONAL ENVIRONMENTAL BOARD, NO.20, B.E.2543.

ND : NOT DETECTED (CYANIDE < 5 µg/L, NITRATE-NITROGEN < 0.02 mg/L, PHENOLS < 0.005 mg/L, MERCURY < 0.0001 mg/L).



(MR BHUCHONK PANICHLERTUMPI)

LABORATORY SUPERVISOR

ANALYSIS REPORT

CUSTOMER NAME : DOUBLE A (1991) PUBLIC CO., LTD. (PULP1)
ADDRESS : 1 MOO 2, THATOOM, SRIMAHAPHOTE, PRACHINBURI THAILAND 25140.
CONTACT INFORMATION : TEL : 08 5835 1371 e-mail : kunnapat_p@doublea1991.com
SAMPLING SOURCE : MONITORING WELL #4
SAMPLE TYPE : GROUNDWATER
SAMPLING DATE : JANUARY 7, 2025
SAMPLING TIME : 13:08 HOUR
SAMPLING METHOD ° : SUBMERSIBLE PUMP
SAMPLING BY ° : MR KRIDSANAPONG NAMTHIP
ANALYZED BY : MISS KEWALEE SUKHAREE

RECEIVED DATE : JANUARY 8, 2025
ANALYTICAL DATE : JANUARY 8-14, 2025
ISSUE DATE : JANUARY 18, 2025
REPORT NO. : 2025-U003763
WORK NO. : 2024-009408
ANALYSIS NO. : T25AA213-0004

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD
			MONITORING WELL #4 T25AA213-0004	
COLOUR °	Platinum-Cobalt	VISUAL COMPARISON METHOD (SM: PART 2120 B)	10	-
ELECTRICAL CONDUCTIVITY °	µS/cm	ELECTRICAL CONDUCTIVITY METHOD (AT SITE) SM: PART 2510 B AND 1060 B	1,447 (30.2°C)	-
AMMONIA-NITROGEN °	mg/L NH ₃ -N	PHENATE METHOD (SM: PART 4500-NH ₃ F)	2.92	-
CYANIDE °	µg/L CN ⁻	DISTILLATION, PYRIDINE-BARBITURIC ACID METHOD (SM: PART 4500-CN ⁻ C AND PART 4500-CN ⁻ E)	ND	≤ 200
NITRATE-NITROGEN °	mg/L NO ₃ ⁻ -N	CADMIUM REDUCTION METHOD (SM: PART 4500-NO ₃ ⁻ E)	ND	-
PHENOLS °	mg/L	DISTILLATION, 4-AMINOANTIPYRINE METHOD (SM: PART 5530 B AND PART 5530 C)	ND	-
TOTAL PHOSPHATE °	mg/L PO ₄ ³⁻	PERSULPHATE DIGESTION AND ASCORBIC ACID METHOD (SM: PART 4500- P B AND PART 4500-P E)	0.21	-
CHLORIDE °	mg/L Cl ⁻	ARGENTOMETRIC METHOD (SM: PART 4500-Cl ⁻ B)	280	-
SULPHATE °	mg/L SO ₄ ²⁻	TURBIDIMETRIC METHOD (SM: PART 4500- SO ₄ ²⁻ E)	606	-
ALKALINITY °	mg/L CaCO ₃	TITRATION METHOD (SM: PART 2320 B)	309	-

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD
			MONITORING WELL #4 T25AA213-0004	
METALS				
MERCURY ^b	mg/L Hg	IN-HOUSE METHOD: UAE.TP.HEM.002 BASED ON SM: PART 3112 B	ND	≤ 0.001
SODIUM ^c	mg/L Na	NITRIC ACID-HYDROCHLORIC ACID DIGESTION AND INDUCTIVELY COUPLED PLASMA (ICP) METHOD (SM: PART 3030 F AND PART 3120 B)	287	-
SAMPLE CONDITION				
WATER'S COLOUR/TURBID SEDIMENT			YELLOW/CLEAR BROWN	

^a : ISO/IEC 17025 ACCREDITED BY THAI INDUSTRIAL STANDARDS INSTITUTE (TISI)

^b : ISO/IEC 17025 ACCREDITED BY DEPARTMENT OF SCIENCE SERVICE (DSS)

^c : VERIFIED BY OWN LABORATORY QUALITY SYSTEM, BUT STILL NOT ACCREDITED

SM : STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 24th EDITION, 2023.

REGULATORY STANDARD : NOTIFICATION OF THE NATIONAL ENVIRONMENTAL BOARD, NO.20, B.E.2543.

ND : NOT DETECTED (CYANIDE < 5 µg/L, NITRATE-NITROGEN < 0.02 mg/L, PHENOLS < 0.005 mg/L, MERCURY < 0.0001 mg/L).



(MR BHUCHONK PANICHLERTUMPI)

LABORATORY SUPERVISOR

ANALYSIS REPORT

CUSTOMER NAME : DOUBLE A (1991) PUBLIC CO., LTD. (PULP1)

ADDRESS : 1 MOO 2, THATOOM, SRIMAHAPHOTE, PRACHINBURI THAILAND 25140.

CONTACT INFORMATION : TEL : 08 5835 1371 e-mail : kunnapat_p@doublea1991.com

SAMPLING SOURCE : MONITORING WELL #1

SAMPLE TYPE : GROUNDWATER **RECEIVED DATE** : FEBRUARY 5, 2025

SAMPLING DATE : FEBRUARY 4, 2025 **ANALYTICAL DATE** : FEBRUARY 5-14, 2025

SAMPLING TIME : 14:13 HOUR **ISSUE DATE** : FEBRUARY 18, 2025

SAMPLING METHOD ° : SUBMERSIBLE PUMP **REPORT NO.** : 2025-U012382

SAMPLING BY ° : MR KRIDSANAPONG NAMTHIP **WORK NO.** : 2024-009408

ANALYZED BY : MISS KEWALEE SUKHAREE **ANALYSIS NO.** : T25AC284-0001

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD
			MONITORING WELL #1 T25AC284-0001	
COLOUR °	Platinum-Cobalt	VISUAL COMPARISON METHOD (SM: PART 2120 B)	< 5	-
ELECTRICAL CONDUCTIVITY °	µS/cm	ELECTRICAL CONDUCTIVITY METHOD (AT SITE) SM: PART 2510 B AND 1060 B	1,780 (29.2°C)	-
AMMONIA-NITROGEN °	mg/L NH ₃ -N	PHENATE METHOD (SM: PART 4500-NH ₃ F)	1.54	-
CYANIDE °	µg/L CN ⁻	DISTILLATION, PYRIDINE-BARBITURIC ACID METHOD (SM: PART 4500-CN ⁻ C AND PART 4500-CN ⁻ E)	ND	≤ 200
NITRATE-NITROGEN °	mg/L NO ₃ ⁻ -N	CADMIUM REDUCTION METHOD (SM: PART 4500-NO ₃ ⁻ E)	ND	-
PHENOLS °	mg/L	DISTILLATION, 4-AMINOANTIPYRINE METHOD (SM: PART 5530 B AND PART 5530 C)	ND	-
TOTAL PHOSPHATE °	mg/L PO ₄ ³⁻	PERSULPHATE DIGESTION AND ASCORBIC ACID METHOD (SM: PART 4500- P B AND PART 4500-P E)	ND	-
CHLORIDE °	mg/L Cl ⁻	ARGENTOMETRIC METHOD (SM: PART 4500-Cl ⁻ B)	251	-
SULPHATE °	mg/L SO ₄ ²⁻	TURBIDIMETRIC METHOD (SM: PART 4500- SO ₄ ²⁻ E)	658	-
ALKALINITY °	mg/L CaCO ₃	TITRATION METHOD (SM: PART 2320 B)	163	-



NSC-TISI-TIS 17025
TESTING 0207



TESTING
No. 0063

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD
			MONITORING WELL #1	
			T25AC284-0001	
METALS				
MERCURY ^b	mg/L Hg	IN-HOUSE METHOD: UAE.TP.HEM.002 BASED ON SM: PART 3112 B	< LOQ	≤ 0.001
SODIUM ^c	mg/L Na	NITRIC ACID-HYDROCHLORIC ACID DIGESTION AND INDUCTIVELY COUPLED PLASMA (ICP) METHOD (SM: PART 3030 F AND PART 3120 B)	365	-
SAMPLE CONDITION				
WATER'S COLOUR/TURBID SEDIMENT			YELLOW/TURBID BROWN	

^a : ISO/IEC 17025 ACCREDITED BY THAI INDUSTRIAL STANDARDS INSTITUTE (TISI)

^b : ISO/IEC 17025 ACCREDITED BY DEPARTMENT OF SCIENCE SERVICE (DSS)

^c : VERIFIED BY OWN LABORATORY QUALITY SYSTEM, BUT NOT IN SCOPE OF ACCREDITATION

SM : STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 24th EDITION, 2023.

REGULATORY STANDARD : NOTIFICATION OF THE NATIONAL ENVIRONMENTAL BOARD, NO.20, B.E.2543.

ND : NOT DETECTED (CYANIDE < 5 µg/L, NITRATE-NITROGEN < 0.02 mg/L, PHENOLS < 0.005 mg/L, TOTAL PHOSPHATE < 0.03 mg/L).

< LOQ : LIMIT OF QUANTITATION (MERCURY ≥ 0.0001 AND < 0.0005 mg/L).

(MR BHUCHONK PANICHLERTUMPI)
LABORATORY SUPERVISOR

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BY BSI GROUP (THAILAND) CO.,LTD.

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- THIS ANALYSIS REPORT APPROVES ONLY FOR THE SAMPLES AS RECEIVED.

ANALYSIS REPORT

CUSTOMER NAME : DOUBLE A (1991) PUBLIC CO., LTD. (PULP1)

ADDRESS : 1 MOO 2, THATOOM, SRIMAHAPHOTE, PRACHINBURI THAILAND 25140.

CONTACT INFORMATION : TEL : 08 5835 1371 e-mail : kunnapat_p@doublea1991.com

SAMPLING SOURCE : MONITORING WELL #1

SAMPLE TYPE : GROUNDWATER **RECEIVED DATE** : FEBRUARY 5, 2025

SAMPLING DATE : FEBRUARY 4, 2025 **ANALYTICAL DATE** : FEBRUARY 5-14, 2025

SAMPLING TIME : 14:13 HOUR **ISSUE DATE** : FEBRUARY 18, 2025

SAMPLING METHOD ° : SUBMERSIBLE PUMP **REPORT NO.** : 2025-U012382

SAMPLING BY ° : MR KRIDSANAPONG NAMTHIP **WORK NO.** : 2024-009408

ANALYZED BY : MISS KEWALEE SUKHAREE **ANALYSIS NO.** : T25AC284-0001

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD
			MONITORING WELL #1 T25AC284-0001	
COLOUR °	Platinum-Cobalt	VISUAL COMPARISON METHOD (SM: PART 2120 B)	< 5	-
ELECTRICAL CONDUCTIVITY °	µS/cm	ELECTRICAL CONDUCTIVITY METHOD (AT SITE) SM: PART 2510 B AND 1060 B	1,780 (29.2°C)	-
AMMONIA-NITROGEN °	mg/L NH ₃ -N	PHENATE METHOD (SM: PART 4500-NH ₃ F)	1.54	-
CYANIDE °	µg/L CN ⁻	DISTILLATION, PYRIDINE-BARBITURIC ACID METHOD (SM: PART 4500-CN ⁻ C AND PART 4500-CN ⁻ E)	ND	≤ 200
NITRATE-NITROGEN °	mg/L NO ₃ ⁻ -N	CADMIUM REDUCTION METHOD (SM: PART 4500-NO ₃ ⁻ E)	ND	-
PHENOLS °	mg/L	DISTILLATION, 4-AMINOANTIPYRINE METHOD (SM: PART 5530 B AND PART 5530 C)	ND	-
TOTAL PHOSPHATE °	mg/L PO ₄ ³⁻	PERSULPHATE DIGESTION AND ASCORBIC ACID METHOD (SM: PART 4500- P B AND PART 4500-P E)	ND	-
CHLORIDE °	mg/L Cl ⁻	ARGENTOMETRIC METHOD (SM: PART 4500-Cl ⁻ B)	251	-
SULPHATE °	mg/L SO ₄ ²⁻	TURBIDIMETRIC METHOD (SM: PART 4500- SO ₄ ²⁻ E)	658	-
ALKALINITY °	mg/L CaCO ₃	TITRATION METHOD (SM: PART 2320 B)	163	-

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD
			MONITORING WELL #1	
			T25AC284-0001	
METALS				
MERCURY ^b	mg/L Hg	IN-HOUSE METHOD: UAE.TP.HEM.002 BASED ON SM: PART 3112 B	< LOQ	≤ 0.001
SODIUM ^c	mg/L Na	NITRIC ACID-HYDROCHLORIC ACID DIGESTION AND INDUCTIVELY COUPLED PLASMA (ICP) METHOD (SM: PART 3030 F AND PART 3120 B)	365	-
SAMPLE CONDITION				
WATER'S COLOUR/TURBID			YELLOW/TURBID	
SEDIMENT			BROWN	

^a : ISO/IEC 17025 ACCREDITED BY THAI INDUSTRIAL STANDARDS INSTITUTE (TISI)

^b : ISO/IEC 17025 ACCREDITED BY DEPARTMENT OF SCIENCE SERVICE (DSS)

^c : VERIFIED BY OWN LABORATORY QUALITY SYSTEM, BUT NOT IN SCOPE OF ACCREDITATION

SM : STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 24th EDITION, 2023.

REGULATORY STANDARD : NOTIFICATION OF THE NATIONAL ENVIRONMENTAL BOARD, NO.20, B.E.2543.

ND : NOT DETECTED (CYANIDE < 5 µg/L, NITRATE-NITROGEN < 0.02 mg/L, PHENOLS < 0.005 mg/L, TOTAL PHOSPHATE < 0.03 mg/L).

< LOQ : LIMIT OF QUANTITATION (MERCURY ≥ 0.0001 AND < 0.0005 mg/L).

(MR BHUCHONK PANICHLERTUMPI)

LABORATORY SUPERVISOR

ANALYSIS REPORT

CUSTOMER NAME : DOUBLE A (1991) PUBLIC CO., LTD. (PULP1)

ADDRESS : 1 MOO 2, THATOOM, SRIMAHAPHOTE, PRACHINBURI THAILAND 25140.

CONTACT INFORMATION : TEL : 08 5835 1371 e-mail : kunnapat_p@doublea1991.com

SAMPLING SOURCE : MONITORING WELL #2

SAMPLE TYPE : GROUNDWATER

SAMPLING DATE : FEBRUARY 4, 2025

SAMPLING TIME : 14:21 HOUR

SAMPLING METHOD ° : SUBMERSIBLE PUMP

SAMPLING BY ° : MR KRIDSANAPONG NAMTHIP

ANALYZED BY : MISS KEWALEE SUKHAREE

RECEIVED DATE : FEBRUARY 5, 2025

ANALYTICAL DATE : FEBRUARY 5-14, 2025

ISSUE DATE : FEBRUARY 18, 2025

REPORT NO. : 2025-U012383

WORK NO. : 2024-009408

ANALYSIS NO. : T25AC284-0002

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD
			MONITORING WELL #2 T25AC284-0002	
COLOUR °	Platinum-Cobalt	VISUAL COMPARISON METHOD (SM: PART 2120 B)	5	-
ELECTRICAL CONDUCTIVITY °	µS/cm	ELECTRICAL CONDUCTIVITY METHOD (AT SITE) SM: PART 2510 B AND 1060 B	1,753 (29.7°C)	-
AMMONIA-NITROGEN °	mg/L NH ₃ -N	PHENATE METHOD (SM: PART 4500-NH ₃ F)	2.78	-
CYANIDE °	µg/L CN ⁻	DISTILLATION, PYRIDINE-BARBITURIC ACID METHOD (SM: PART 4500-CN ⁻ C AND PART 4500-CN ⁻ E)	ND	≤ 200
NITRATE-NITROGEN °	mg/L NO ₃ ⁻ -N	CADMIUM REDUCTION METHOD (SM: PART 4500-NO ₃ ⁻ E)	ND	-
PHENOLS °	mg/L	DISTILLATION, 4-AMINOANTIPYRINE METHOD (SM: PART 5530 B AND PART 5530 C)	ND	-
TOTAL PHOSPHATE °	mg/L PO ₄ ³⁻	PERSULPHATE DIGESTION AND ASCORBIC ACID METHOD (SM: PART 4500- P B AND PART 4500-P E)	ND	-
CHLORIDE °	mg/L Cl ⁻	ARGENTOMETRIC METHOD (SM: PART 4500-Cl ⁻ B)	288	-
SULPHATE °	mg/L SO ₄ ²⁻	TURBIDIMETRIC METHOD (SM: PART 4500- SO ₄ ²⁻ E)	587	-
ALKALINITY °	mg/L CaCO ₃	TITRATION METHOD (SM: PART 2320 B)	234	-

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD
			MONITORING WELL #2	
			T25AC284-0002	
METALS				
MERCURY ^b	mg/L Hg	IN-HOUSE METHOD: UAE.TP.HEM.002 BASED ON SM: PART 3112 B	< LOQ	≤ 0.001
SODIUM ^c	mg/L Na	NITRIC ACID-HYDROCHLORIC ACID DIGESTION AND INDUCTIVELY COUPLED PLASMA (ICP) METHOD (SM: PART 3030 F AND PART 3120 B)	359	-
SAMPLE CONDITION				
WATER'S COLOUR/TURBID SEDIMENT			YELLOW/CLEAR BROWN	

^a : ISO/IEC 17025 ACCREDITED BY THAI INDUSTRIAL STANDARDS INSTITUTE (TISI)

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< LOQ : LIMIT OF QUANTITATION (MERCURY ≥ 0.0001 AND < 0.0005 mg/L).

(MR BHUCHONK PANICHLERTUMPI)

LABORATORY SUPERVISOR

ANALYSIS REPORT

CUSTOMER NAME	: DOUBLE A (1991) PUBLIC CO., LTD. (PULP1)	RECEIVED DATE	: FEBRUARY 5, 2025
ADDRESS	: 1 MOO 2, THATOOM, SRIMAHAPHOTE, PRACHINBURI THAILAND 25140.	ANALYTICAL DATE	: FEBRUARY 5-14, 2025
CONTACT INFORMATION	: TEL : 08 5835 1371 e-mail : kunnapat_p@doublea1991.com	ISSUE DATE	: FEBRUARY 18, 2025
SAMPLING SOURCE	: MONITORING WELL #3	REPORT NO.	: 2025-U012384
SAMPLE TYPE	: GROUNDWATER	WORK NO.	: 2024-009408
SAMPLING DATE	: FEBRUARY 4, 2025	ANALYSIS NO.	: T25AC284-0003
SAMPLING TIME	: 13:57 HOUR		
SAMPLING METHOD °	: SUBMERSIBLE PUMP		
SAMPLING BY °	: MR KRIDSANAPONG NAMTHIP		
ANALYZED BY	: MISS KEWALEE SUKHAREE		

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD
			MONITORING WELL #3 T25AC284-0003	
COLOUR °	Platinum-Cobalt	VISUAL COMPARISON METHOD (SM: PART 2120 B)	10	-
ELECTRICAL CONDUCTIVITY °	µS/cm	ELECTRICAL CONDUCTIVITY METHOD (AT SITE) SM: PART 2510 B AND 1060 B	1,906 (30.6°C)	-
AMMONIA-NITROGEN °	mg/L NH ₃ -N	PHENATE METHOD (SM: PART 4500-NH ₃ F)	2.07	-
CYANIDE °	µg/L CN ⁻	DISTILLATION, PYRIDINE-BARBITURIC ACID METHOD (SM: PART 4500-CN ⁻ C AND PART 4500-CN ⁻ E)	ND	≤ 200
NITRATE-NITROGEN °	mg/L NO ₃ ⁻ -N	CADMIUM REDUCTION METHOD (SM: PART 4500-NO ₃ ⁻ E)	ND	-
PHENOLS °	mg/L	DISTILLATION, 4-AMINOANTIPYRINE METHOD (SM: PART 5530 B AND PART 5530 C)	ND	-
TOTAL PHOSPHATE °	mg/L PO ₄ ³⁻	PERSULPHATE DIGESTION AND ASCORBIC ACID METHOD (SM: PART 4500- P B AND PART 4500-P E)	ND	-
CHLORIDE °	mg/L Cl ⁻	ARGENTOMETRIC METHOD (SM: PART 4500-Cl ⁻ B)	283	-
SULPHATE °	mg/L SO ₄ ²⁻	TURBIDIMETRIC METHOD (SM: PART 4500- SO ₄ ²⁻ E)	613	-
ALKALINITY °	mg/L CaCO ₃	TITRATION METHOD (SM: PART 2320 B)	305	-

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD
			MONITORING WELL #3 T25AC284-0003	
METALS				
MERCURY ^b	mg/L Hg	IN-HOUSE METHOD: UAE.TP.HEM.002 BASED ON SM: PART 3112 B	< LOQ	≤ 0.001
SODIUM ^c	mg/L Na	NITRIC ACID-HYDROCHLORIC ACID DIGESTION AND INDUCTIVELY COUPLED PLASMA (ICP) METHOD (SM: PART 3030 F AND PART 3120 B)	353	-
SAMPLE CONDITION				
WATER'S COLOUR/TURBID SEDIMENT			YELLOW/CLEAR BROWN	

^a : ISO/IEC 17025 ACCREDITED BY THAI INDUSTRIAL STANDARDS INSTITUTE (TISI)

^b : ISO/IEC 17025 ACCREDITED BY DEPARTMENT OF SCIENCE SERVICE (DSS)

^c : VERIFIED BY OWN LABORATORY QUALITY SYSTEM, BUT NOT IN SCOPE OF ACCREDITATION

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REGULATORY STANDARD : NOTIFICATION OF THE NATIONAL ENVIRONMENTAL BOARD, NO.20, B.E.2543.

ND : NOT DETECTED (CYANIDE < 5 µg/L, NITRATE-NITROGEN < 0.02 mg/L, PHENOLS < 0.005 mg/L, TOTAL PHOSPHATE < 0.03 mg/L).

< LOQ : LIMIT OF QUANTITATION (MERCURY ≥ 0.0001 AND < 0.0005 mg/L).

(MR BHUCHONK PANICHLERTUMPI)

LABORATORY SUPERVISOR

ANALYSIS REPORT

CUSTOMER NAME : DOUBLE A (1991) PUBLIC CO., LTD. (PULP1)
ADDRESS : 1 MOO 2, THATOOM, SRIMAHAPHOTE, PRACHINBURI THAILAND 25140.
CONTACT INFORMATION : TEL : 08 5835 1371 e-mail : kunnapat_p@doublea1991.com
SAMPLING SOURCE : MONITORING WELL #4
SAMPLE TYPE : GROUNDWATER
SAMPLING DATE : FEBRUARY 4, 2025
SAMPLING TIME : 13:42 HOUR
SAMPLING METHOD ° : SUBMERSIBLE PUMP
SAMPLING BY ° : MR KRIDSANAPONG NAMTHIP
ANALYZED BY : MISS KEWALEE SUKHAREE

RECEIVED DATE : FEBRUARY 5, 2025
ANALYTICAL DATE : FEBRUARY 5-14, 2025
ISSUE DATE : FEBRUARY 18, 2025
REPORT NO. : 2025-U012385
WORK NO. : 2024-009408
ANALYSIS NO. : T25AC284-0004

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD
			MONITORING WELL #4 T25AC284-0004	
COLOUR °	Platinum-Cobalt	VISUAL COMPARISON METHOD (SM: PART 2120 B)	10	-
ELECTRICAL CONDUCTIVITY °	µS/cm	ELECTRICAL CONDUCTIVITY METHOD (AT SITE) SM: PART 2510 B AND 1060 B	2,036 (30.5°C)	-
AMMONIA-NITROGEN °	mg/L NH ₃ -N	PHENATE METHOD (SM: PART 4500-NH ₃ F)	3.31	-
CYANIDE °	µg/L CN ⁻	DISTILLATION, PYRIDINE-BARBITURIC ACID METHOD (SM: PART 4500-CN ⁻ C AND PART 4500-CN ⁻ E)	ND	≤ 200
NITRATE-NITROGEN °	mg/L NO ₃ ⁻ -N	CADMIUM REDUCTION METHOD (SM: PART 4500-NO ₃ ⁻ E)	ND	-
PHENOLS °	mg/L	DISTILLATION, 4-AMINOANTIPYRINE METHOD (SM: PART 5530 B AND PART 5530 C)	ND	-
TOTAL PHOSPHATE °	mg/L PO ₄ ³⁻	PERSULPHATE DIGESTION AND ASCORBIC ACID METHOD (SM: PART 4500- P B AND PART 4500-P E)	ND	-
CHLORIDE °	mg/L Cl ⁻	ARGENTOMETRIC METHOD (SM: PART 4500-Cl ⁻ B)	310	-
SULPHATE °	mg/L SO ₄ ²⁻	TURBIDIMETRIC METHOD (SM: PART 4500- SO ₄ ²⁻ E)	673	-
ALKALINITY °	mg/L CaCO ₃	TITRATION METHOD (SM: PART 2320 B)	267	-

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD
			MONITORING WELL #4 T25AC284-0004	
METALS				
MERCURY ^b	mg/L Hg	IN-HOUSE METHOD: UAE.TP.HEM.002 BASED ON SM: PART 3112 B	< LOQ	≤ 0.001
SODIUM ^c	mg/L Na	NITRIC ACID-HYDROCHLORIC ACID DIGESTION AND INDUCTIVELY COUPLED PLASMA (ICP) METHOD (SM: PART 3030 F AND PART 3120 B)	304	-
SAMPLE CONDITION				
WATER'S COLOUR/TURBID SEDIMENT			YELLOW/TURBID BROWN	

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< LOQ : LIMIT OF QUANTITATION (MERCURY ≥ 0.0001 AND < 0.0005 mg/L).


(MR BHUCHONK PANICHLERTUMPI)
LABORATORY SUPERVISOR

ANALYSIS REPORT

CUSTOMER NAME : DOUBLE A (1991) PUBLIC CO., LTD. (PULP1)
ADDRESS : 1 MOO 2, THATOOM, SRIMAHAPHOTE, PRACHINBURI THAILAND 25140.
CONTACT INFORMATION : TEL : 08 5835 1371 e-mail : kunnapat_p@doublea1991.com
SAMPLING SOURCE : MONITORING WELL #1
SAMPLE TYPE : GROUNDWATER
SAMPLING DATE : MARCH 3, 2025
SAMPLING TIME : 15:12 HOUR
SAMPLING METHOD ° : SUBMERSIBLE PUMP
SAMPLING BY ° : MR KRIDSANAPONG NAMTHIP
ANALYZED BY : MISS KEWALEE SUKHAREE

RECEIVED DATE : MARCH 4, 2025
ANALYTICAL DATE : MARCH 4-10, 2025
ISSUE DATE : MARCH 14, 2025
REPORT NO. : 2025-U021251
WORK NO. : 2024-009408
ANALYSIS NO. : T25AE491-0001

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD
			MONITORING WELL #1 T25AE491-0001	
COLOUR °	Platinum-Cobalt	VISUAL COMPARISON METHOD (SM: PART 2120 B)	5	-
ELECTRICAL CONDUCTIVITY °	µS/cm	ELECTRICAL CONDUCTIVITY METHOD (AT SITE) SM: PART 2510 B AND 1060 B	1,943 (29.0°C)	-
AMMONIA-NITROGEN °	mg/L NH ₃ -N	PHENATE METHOD (SM: PART 4500-NH ₃ F)	1.88	-
CYANIDE °	µg/L CN ⁻	DISTILLATION, PYRIDINE-BARBITURIC ACID METHOD (SM: PART 4500-CN ⁻ C AND PART 4500-CN ⁻ E)	ND	≤ 200
NITRATE-NITROGEN °	mg/L NO ₃ ⁻ -N	CADMIUM REDUCTION METHOD (SM: PART 4500-NO ₃ ⁻ E)	ND	-
PHENOLS °	mg/L	DISTILLATION, 4-AMINOANTIPYRINE METHOD (SM: PART 5530 B AND PART 5530 C)	ND	-
TOTAL PHOSPHATE °	mg/L PO ₄ ³⁻	PERSULPHATE DIGESTION AND ASCORBIC ACID METHOD (SM: PART 4500- P B AND PART 4500-P E)	< 0.15	-
CHLORIDE °	mg/L Cl ⁻	ARGENTOMETRIC METHOD (SM: PART 4500-Cl ⁻ B)	259	-
SULPHATE °	mg/L SO ₄ ²⁻	TURBIDIMETRIC METHOD (SM: PART 4500-SO ₄ ²⁻ E)	554	-
ALKALINITY °	mg/L CaCO ₃	TITRATION METHOD (SM: PART 2320 B)	174	-

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD
			MONITORING WELL #1	
			T25AE491-0001	
METALS				
MERCURY ^b	mg/L Hg	IN-HOUSE METHOD: UAE.TP.HEM.002 BASED ON SM: PART 3112 B	ND	≤ 0.001
SODIUM ^c	mg/L Na	NITRIC ACID-HYDROCHLORIC ACID DIGESTION AND INDUCTIVELY COUPLED PLASMA (ICP) METHOD (SM: PART 3030 F AND PART 3120 B)	283	-
SAMPLE CONDITION				
WATER'S COLOUR/TURBID			YELLOW/CLEAR	
SEDIMENT			BROWN	

^a : ISO/IEC 17025 ACCREDITED BY THAI INDUSTRIAL STANDARDS INSTITUTE (TISI)

^b : ISO/IEC 17025 ACCREDITED BY DEPARTMENT OF SCIENCE SERVICE (DSS)

^c : VERIFIED BY OWN LABORATORY QUALITY SYSTEM, BUT NOT IN SCOPE OF ACCREDITATION

SM : STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 24th EDITION, 2023.

REGULATORY STANDARD : NOTIFICATION OF THE NATIONAL ENVIRONMENTAL BOARD, NO.20, B.E.2543.

ND : NOT DETECTED (CYANIDE < 5 µg/L, NITRATE-NITROGEN < 0.02 mg/L, PHENOLS < 0.005 mg/L, MERCURY < 0.0001 mg/L).

(MR BHUCHONK PANICHLERTUMPI)
LABORATORY SUPERVISOR

ANALYSIS REPORT

CUSTOMER NAME : DOUBLE A (1991) PUBLIC CO., LTD. (PULP1)
ADDRESS : 1 MOO 2, THATOOM, SRIMAHAPHOTE, PRACHINBURI THAILAND 25140.
CONTACT INFORMATION : TEL : 08 5835 1371 e-mail : kunnapat_p@doublea1991.com
SAMPLING SOURCE : MONITORING WELL #2
SAMPLE TYPE : GROUNDWATER
SAMPLING DATE : MARCH 3, 2025
SAMPLING TIME : 14:55 HOUR
SAMPLING METHOD ° : SUBMERSIBLE PUMP
SAMPLING BY ° : MR KRIDSANAPONG NAMTHIP
ANALYZED BY : MISS KEWALEE SUKHAREE

RECEIVED DATE : MARCH 4, 2025
ANALYTICAL DATE : MARCH 4-10, 2025
ISSUE DATE : MARCH 14, 2025
REPORT NO. : 2025-U021253
WORK NO. : 2024-009408
ANALYSIS NO. : T25AE491-0002

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD
			MONITORING WELL #2 T25AE491-0002	
COLOUR °	Platinum-Cobalt	VISUAL COMPARISON METHOD (SM: PART 2120 B)	5	-
ELECTRICAL CONDUCTIVITY °	µS/cm	ELECTRICAL CONDUCTIVITY METHOD (AT SITE) SM: PART 2510 B AND 1060 B	1,980 (30.2°C)	-
AMMONIA-NITROGEN °	mg/L NH ₃ -N	PHENATE METHOD (SM: PART 4500-NH ₃ F)	3.35	-
CYANIDE °	µg/L CN ⁻	DISTILLATION, PYRIDINE-BARBITURIC ACID METHOD (SM: PART 4500-CN ⁻ C AND PART 4500-CN ⁻ E)	ND	≤ 200
NITRATE-NITROGEN °	mg/L NO ₃ ⁻ -N	CADMIUM REDUCTION METHOD (SM: PART 4500-NO ₃ ⁻ E)	ND	-
PHENOLS °	mg/L	DISTILLATION, 4-AMINOANTIPYRINE METHOD (SM: PART 5530 B AND PART 5530 C)	ND	-
TOTAL PHOSPHATE °	mg/L PO ₄ ³⁻	PERSULPHATE DIGESTION AND ASCORBIC ACID METHOD (SM: PART 4500- P B AND PART 4500-P E)	< 0.15	-
CHLORIDE *	mg/L Cl ⁻	ARGENTOMETRIC METHOD (SM: PART 4500-Cl ⁻ B)	288	-
SULPHATE °	mg/L SO ₄ ²⁻	TURBIDIMETRIC METHOD (SM: PART 4500-SO ₄ ²⁻ E)	594	-
ALKALINITY °	mg/L CaCO ₃	TITRATION METHOD (SM: PART 2320 B)	236	-

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD
			MONITORING WELL #2	
			T25AE491-0002	
METALS				
MERCURY ^b	mg/L Hg	IN-HOUSE METHOD: UAE.TP.HEM.002 BASED ON SM: PART 3112 B	ND	≤ 0.001
SODIUM ^c	mg/L Na	NITRIC ACID-HYDROCHLORIC ACID DIGESTION AND INDUCTIVELY COUPLED PLASMA (ICP) METHOD (SM: PART 3030 F AND PART 3120 B)	229	-
SAMPLE CONDITION				
WATER'S COLOUR/TURBID			YELLOW/CLEAR	
SEDIMENT			BROWN	

^a : ISO/IEC 17025 ACCREDITED BY THAI INDUSTRIAL STANDARDS INSTITUTE (TISI)

^b : ISO/IEC 17025 ACCREDITED BY DEPARTMENT OF SCIENCE SERVICE (DSS)

^c : VERIFIED BY OWN LABORATORY QUALITY SYSTEM, BUT NOT IN SCOPE OF ACCREDITATION

SM : STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 24th EDITION, 2023.

REGULATORY STANDARD : NOTIFICATION OF THE NATIONAL ENVIRONMENTAL BOARD, NO.20, B.E.2543.

ND : NOT DETECTED (CYANIDE < 5 µg/L, NITRATE-NITROGEN < 0.02 mg/L, PHENOLS < 0.005 mg/L, MERCURY < 0.0001 mg/L).

(MR BHUCHONK PANICHLERTUMPI)
LABORATORY SUPERVISOR

ANALYSIS REPORT

CUSTOMER NAME : DOUBLE A (1991) PUBLIC CO., LTD. (PULP1)
ADDRESS : 1 MOO 2, THATOOM, SRIMAHAPHOTE, PRACHINBURI THAILAND 25140.
CONTACT INFORMATION : TEL : 08 5835 1371 e-mail : kunnapat_p@doublea1991.com
SAMPLING SOURCE : MONITORING WELL #3
SAMPLE TYPE : GROUNDWATER
SAMPLING DATE : MARCH 3, 2025
SAMPLING TIME : 14:26 HOUR
SAMPLING METHOD ° : SUBMERSIBLE PUMP
SAMPLING BY ° : MR KRIDSANAPONG NAMTHIP
ANALYZED BY : MISS KEWALEE SUKHAREE

RECEIVED DATE : MARCH 4, 2025
ANALYTICAL DATE : MARCH 4-10, 2025
ISSUE DATE : MARCH 14, 2025
REPORT NO. : 2025-U021255
WORK NO. : 2024-009408
ANALYSIS NO. : T25AE491-0003

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD
			MONITORING WELL #3 T25AE491-0003	
COLOUR °	Platinum-Cobalt	VISUAL COMPARISON METHOD (SM: PART 2120 B)	10	-
ELECTRICAL CONDUCTIVITY °	µS/cm	ELECTRICAL CONDUCTIVITY METHOD (AT SITE) SM: PART 2510 B AND 1060 B	2,016 (31.1°C)	-
AMMONIA-NITROGEN °	mg/L NH ₃ -N	PHENATE METHOD (SM: PART 4500-NH ₃ F)	1.91	-
CYANIDE °	µg/L CN ⁻	DISTILLATION, PYRIDINE-BARBITURIC ACID METHOD (SM: PART 4500-CN ⁻ C AND PART 4500-CN ⁻ E)	ND	≤ 200
NITRATE-NITROGEN °	mg/L NO ₃ ⁻ -N	CADMIUM REDUCTION METHOD (SM: PART 4500-NO ₃ ⁻ E)	ND	-
PHENOLS °	mg/L	DISTILLATION, 4-AMINOANTIPYRINE METHOD (SM: PART 5530 B AND PART 5530 C)	ND	-
TOTAL PHOSPHATE °	mg/L PO ₄ ³⁻	PERSULPHATE DIGESTION AND ASCORBIC ACID METHOD (SM: PART 4500- P B AND PART 4500-P E)	< 0.15	-
CHLORIDE °	mg/L Cl ⁻	ARGENTOMETRIC METHOD (SM: PART 4500-Cl ⁻ B)	288	-
SULPHATE °	mg/L SO ₄ ²⁻	TURBIDIMETRIC METHOD (SM: PART 4500-SO ₄ ²⁻ E)	623	-
ALKALINITY °	mg/L CaCO ₃	TITRATION METHOD (SM: PART 2320 B)	293	-

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD
			MONITORING WELL #3	
			T25AE491-0003	
METALS				
MERCURY ^b	mg/L Hg	IN-HOUSE METHOD: UAE.TP.HEM.002 BASED ON SM: PART 3112 B	ND	≤ 0.001
SODIUM ^c	mg/L Na	NITRIC ACID-HYDROCHLORIC ACID DIGESTION AND INDUCTIVELY COUPLED PLASMA (ICP) METHOD (SM: PART 3030 F AND PART 3120 B)	259	-
SAMPLE CONDITION				
WATER'S COLOUR/TURBID			YELLOW/TURBID	
SEDIMENT			BROWN	

^a : ISO/IEC 17025 ACCREDITED BY THAI INDUSTRIAL STANDARDS INSTITUTE (TISI)

^b : ISO/IEC 17025 ACCREDITED BY DEPARTMENT OF SCIENCE SERVICE (DSS)

^c : VERIFIED BY OWN LABORATORY QUALITY SYSTEM, BUT NOT IN SCOPE OF ACCREDITATION

SM : STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 24th EDITION, 2023.

REGULATORY STANDARD : NOTIFICATION OF THE NATIONAL ENVIRONMENTAL BOARD, NO.20, B.E.2543.

ND : NOT DETECTED (CYANIDE < 5 µg/L, NITRATE-NITROGEN < 0.02 mg/L, PHENOLS < 0.005 mg/L, MERCURY < 0.0001 mg/L).

(MR BHUCHONK PANICHLERTUMPI)
LABORATORY SUPERVISOR

ANALYSIS REPORT

CUSTOMER NAME : DOUBLE A (1991) PUBLIC CO., LTD. (PULP1)

ADDRESS : 1 MOO 2, THATOOM, SRIMAHAPHOTE, PRACHINBURI THAILAND 25140.

CONTACT INFORMATION : TEL : 08 5835 1371 e-mail : kunnapat_p@doublea1991.com

SAMPLING SOURCE : MONITORING WELL #4

SAMPLE TYPE : GROUNDWATER

SAMPLING DATE : MARCH 3, 2025

SAMPLING TIME : 14:06 HOUR

SAMPLING METHOD ° : SUBMERSIBLE PUMP

SAMPLING BY ° : MR KRIDSANAPONG NAMTHIP

ANALYZED BY : MISS KEWALEE SUKHAREE

RECEIVED DATE : MARCH 4, 2025

ANALYTICAL DATE : MARCH 4-10, 2025

ISSUE DATE : MARCH 14, 2025

REPORT NO. : 2025-U021256

WORK NO. : 2024-009408

ANALYSIS NO. : T25AE491-0004

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD
			MONITORING WELL #4 T25AE491-0004	
COLOUR °	Platinum-Cobalt	VISUAL COMPARISON METHOD (SM: PART 2120 B)	15	-
ELECTRICAL CONDUCTIVITY °	µS/cm	ELECTRICAL CONDUCTIVITY METHOD (AT SITE) SM: PART 2510 B AND 1060 B	1,964 (30.1°C)	-
AMMONIA-NITROGEN °	mg/L NH ₃ -N	PHENATE METHOD (SM: PART 4500-NH ₃ F)	3.87	-
CYANIDE °	µg/L CN ⁻	DISTILLATION, PYRIDINE-BARBITURIC ACID METHOD (SM: PART 4500-CN ⁻ C AND PART 4500-CN ⁻ E)	ND	≤ 200
NITRATE-NITROGEN °	mg/L NO ₃ ⁻ -N	CADMIUM REDUCTION METHOD (SM: PART 4500-NO ₃ ⁻ E)	ND	-
PHENOLS °	mg/L	DISTILLATION, 4-AMINOANTIPYRINE METHOD (SM: PART 5530 B AND PART 5530 C)	ND	-
TOTAL PHOSPHATE °	mg/L PO ₄ ³⁻	PERSULPHATE DIGESTION AND ASCORBIC ACID METHOD (SM: PART 4500- P B AND PART 4500-P E)	< 0.15	-
CHLORIDE °	mg/L Cl ⁻	ARGENTOMETRIC METHOD (SM: PART 4500-Cl ⁻ B)	335	-
SULPHATE °	mg/L SO ₄ ²⁻	TURBIDIMETRIC METHOD (SM: PART 4500-SO ₄ ²⁻ E)	642	-
ALKALINITY °	mg/L CaCO ₃	TITRATION METHOD (SM: PART 2320 B)	289	-

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD
			MONITORING WELL #4	
			T25AE491-0004	
METALS				
MERCURY ^b	mg/L Hg	IN-HOUSE METHOD: UAE.TP.HEM.002 BASED ON SM: PART 3112 B	ND	≤ 0.001
SODIUM ^c	mg/L Na	NITRIC ACID-HYDROCHLORIC ACID DIGESTION AND INDUCTIVELY COUPLED PLASMA (ICP) METHOD (SM: PART 3030 F AND PART 3120 B)	306	-
SAMPLE CONDITION				
WATER'S COLOUR/TURBID			YELLOW/TURBID	
SEDIMENT			BROWN	

^a : ISO/IEC 17025 ACCREDITED BY THAI INDUSTRIAL STANDARDS INSTITUTE (TISI)


^b : ISO/IEC 17025 ACCREDITED BY DEPARTMENT OF SCIENCE SERVICE (DSS)

^c : VERIFIED BY OWN LABORATORY QUALITY SYSTEM, BUT NOT IN SCOPE OF ACCREDITATION

SM : STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 24th EDITION, 2023.

REGULATORY STANDARD : NOTIFICATION OF THE NATIONAL ENVIRONMENTAL BOARD, NO.20, B.E.2543.

ND : NOT DETECTED (CYANIDE < 5 µg/L, NITRATE-NITROGEN < 0.02 mg/L, PHENOLS < 0.005 mg/L, MERCURY < 0.0001 mg/L).


(MR BHUCHONK PANICHLERTUMPI)
LABORATORY SUPERVISOR

ANALYSIS REPORT

CUSTOMER NAME : DOUBLE A (1991) PUBLIC CO.,LTD (PULP 1)
ADDRESS : 1 MOO 2 THA TUM SI MAHA PHOT PRACHIN BURI 25140
CONTACT INFORMATION : TEL : 08 5835 1371 e-mail : kunnapat_p@doublea1991.com
SAMPLING SOURCE : MONITORING WELL #1
SAMPLE TYPE : GROUNDWATER
SAMPLING DATE : APRIL 1, 2025
SAMPLING TIME : 15:25 HOUR
SAMPLING METHOD ° : SUBMERSIBLE PUMP
SAMPLING BY ° : MR KRIDSANAPONG NAMTHIP
ANALYZED BY : MISS KEWALEE SUKHAREE

RECEIVED DATE : APRIL 2, 2025
ANALYTICAL DATE : APRIL 2-14, 2025
ISSUE DATE : APRIL 18, 2025
REPORT NO. : 2025-U032579
WORK NO. : 2024-009408
ANALYSIS NO. : T25AH168-0001

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT	LIMIT OF QUANTITATION (LOQ)
			MONITORING WELL #1 T25AH168-0001			
COLOUR ^c	Pt-Co	VISUAL COMPARISON METHOD (SM: PART 2120 B)	5	-	-	5
ELECTRICAL CONDUCTIVITY ^c	µS/cm	ELECTRICAL CONDUCTIVITY METHOD (AT SITE) SM: PART 2510 B AND 1060 B	3,137 (30.8°C)	-	0.1	-
AMMONIA-NITROGEN ^c	mg/L NH ₃ -N	PHENATE METHOD (SM: PART 4500-NH ₃ F)	1.75	-	0.04	0.15
CYANIDE ^c	µg/L CN	DISTILLATION, PYRIDINE-BARBITURIC ACID METHOD (SM: PART 4500-CN C AND PART 4500-CN E)	ND	≤ 200	5	20
NITRATE NITROGEN ^c	mg/L NO ₃ -N	CADMIUM REDUCTION METHOD (SM: PART 4500-NO ₃ E)	ND	-	0.02	0.10
PHENOLS ^c	mg/L	DISTILLATION, 4-AMINOANTIPYRINE METHOD (SM: PART 5530 B AND PART 5530 C)	ND	-	0.001	0.005
TOTAL PHOSPHATE ^c	mg/L PO ₄ ³⁻	PERSULPHATE DIGESTION AND ASCORBIC ACID METHOD (SM: PART 4500-P B AND PART 4500-P E)	< 0.15	-	0.03	0.15
CHLORIDE ^a	mg/L Cl	ARGENTOMETRIC METHOD (SM: 4500-Cl B)	269	-	0.5	2.0
SULPHATE ^c	mg/L SO ₄ ²⁻	TURBIDIMETRIC METHOD (SM: PART 4500-SO ₄ ²⁻ E)	839	-	1.0	4.0
ALKALINITY ^c	mg/L as CaCO ₃	TITRATION METHOD (SM: PART 2320 B)	148	-	-	-



PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT	LIMIT OF QUANTITATION (LOQ)
			MONITORING WELL #1 T25AH168-0001			
METALS						
MERCURY ^b	mg/L Hg	IN-HOUSE METHOD: UAE.TP.HEM.002 BASED ON SM: PART 3112 B	< LOQ	≤ 0.001	0.0001	0.0005
SODIUM ^c	mg/L Na	NITRIC ACID-HYDROCHLORIC ACID DIGESTION AND INDUCTIVELY COUPLED PLASMA (ICP) METHOD (SM: PART 3030 F AND PART 3120 B)	425	-	0.005	-
SAMPLE CONDITION						
WATER'S COLOUR/TURBID			YELLOW/CLEAR			
SEDIMENT			BROWN			

^a : ISO/IEC 17025 ACCREDITED BY THAI INDUSTRIAL STANDARDS INSTITUTE (TISI)

^b : ISO/IEC 17025 ACCREDITED BY DEPARTMENT OF SCIENCE SERVICE (DSS)

^c : VERIFIED BY OWN LABORATORY QUALITY SYSTEM, BUT NOT IN SCOPE OF ACCREDITATION

SM : STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 24th EDITION, 2023.

REGULATORY STANDARD : NOTIFICATION OF THE NATIONAL ENVIRONMENTAL BOARD, NO.20, B.E.2543.

ND : NOT DETECTED.

< LOQ : < LIMIT OF QUANTITATION (MERCURY ≥ 0.0001 AND < 0.0005 mg/L).

Bhuchonk

(MR BHUCHONK PANICHLERTUMPI)
LABORATORY SUPERVISOR

ANALYSIS REPORT

CUSTOMER NAME	: DOUBLE A (1991) PUBLIC CO.,LTD (PULP 1)	RECEIVED DATE	: APRIL 2, 2025
ADDRESS	: 1 MOO 2 THA TUM SI MAHA PHOT PRACHIN BURI 25140	ANALYTICAL DATE	: APRIL 2-14, 2025
CONTACT INFORMATION	: TEL : 08 5835 1371 e-mail : kunnapat_p@doublea1991.com	ISSUE DATE	: APRIL 18, 2025
SAMPLING SOURCE	: MONITORING WELL #2	REPORT NO.	: 2025-U032580
SAMPLE TYPE	: GROUNDWATER	WORK NO.	: 2024-009408
SAMPLING DATE	: APRIL 1, 2025	ANALYSIS NO.	: T25AH168-0002
SAMPLING TIME	: 15:40 HOUR		
SAMPLING METHOD °	: SUBMERSIBLE PUMP		
SAMPLING BY °	: MR KRIDSANAPONG NAMTHIP		
ANALYZED BY	: MISS KEWALEE SUKHAREE		

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT	LIMIT OF QUANTITATION (LOQ)
			MONITORING WELL #2 T25AH168-0002			
COLOUR ^c	Pt-Co	VISUAL COMPARISON METHOD (SM: PART 2120 B)	5	-	-	5
ELECTRICAL CONDUCTIVITY ^c	µS/cm	ELECTRICAL CONDUCTIVITY METHOD (AT SITE) SM: PART 2510 B AND 1060 B	3,133 (31.2°C)	-	0.1	-
AMMONIA-NITROGEN ^f	mg/L NH ₃ -N	PHENATE METHOD (SM: PART 4500-NH ₃ F)	3.06	-	0.04	0.15
CYANIDE ^c	µg/L CN	DISTILLATION, PYRIDINE-BARBITURIC ACID METHOD (SM: PART 4500-CN C AND PART 4500-CN E)	ND	≤ 200	5	20
NITRATE NITROGEN ^f	mg/L NO ₃ -N	CADMIUM REDUCTION METHOD (SM: PART 4500-NO ₃ E)	ND	-	0.02	0.10
PHENOLS ^c	mg/L	DISTILLATION, 4-AMINOANTIPYRINE METHOD (SM: PART 5530 B AND PART 5530 C)	ND	-	0.001	0.005
TOTAL PHOSPHATE ^c	mg/L PO ₄ ³⁻	PERSULPHATE DIGESTION AND ASCORBIC ACID METHOD (SM: PART 4500-P B AND PART 4500-P E)	0.15	-	0.03	0.15
CHLORIDE ^a	mg/L Cl ⁻	ARGENTOMETRIC METHOD (SM: 4500-Cl B)	318	-	0.5	2.0
SULPHATE ^c	mg/L SO ₄ ²⁻	TURBIDIMETRIC METHOD (SM: PART 4500-SO ₄ ²⁻ E)	620	-	1.0	4.0
ALKALINITY ^c	mg/L as CaCO ₃	TITRATION METHOD (SM: PART 2320 B)	240	-	-	-



PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT	LIMIT OF QUANTITATION (LOQ)
			MONITORING WELL #2 T25AH168-0002			
METALS						
MERCURY ^b	mg/L Hg	IN-HOUSE METHOD: UAE.TP.HEM.002 BASED ON SM: PART 3112 B	< LOQ	≤ 0.001	0.0001	0.0005
SODIUM ^c	mg/L Na	NITRIC ACID-HYDROCHLORIC ACID DIGESTION AND INDUCTIVELY COUPLED PLASMA (ICP) METHOD (SM: PART 3030 F AND PART 3120 B)	287	-	0.005	-
SAMPLE CONDITION						
WATER'S COLOUR/TURBID			YELLOW/CLEAR			
SEDIMENT			BROWN			

^a : ISO/IEC 17025 ACCREDITED BY THAI INDUSTRIAL STANDARDS INSTITUTE (TISI)

^b : ISO/IEC 17025 ACCREDITED BY DEPARTMENT OF SCIENCE SERVICE (DSS)

^c : VERIFIED BY OWN LABORATORY QUALITY SYSTEM, BUT NOT IN SCOPE OF ACCREDITATION

SM : STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 24th EDITION, 2023.

REGULATORY STANDARD : NOTIFICATION OF THE NATIONAL ENVIRONMENTAL BOARD, NO.20, B.E.2543.

ND : NOT DETECTED.

< LOQ : < LIMIT OF QUANTITATION (MERCURY ≥ 0.0001 AND < 0.0005 mg/L).

Bhuchonk p.

(MR BHUCHONK PANICHLERTUMPI)
LABORATORY SUPERVISOR

ANALYSIS REPORT

CUSTOMER NAME : DOUBLE A (1991) PUBLIC CO.,LTD (PULP 1)
ADDRESS : 1 MOO 2 THA TUM SI MAHA PHOT PRACHIN BURI 25140
CONTACT INFORMATION : TEL : 08 5835 1371 e-mail : kunnapat_p@doublea1991.com
SAMPLING SOURCE : MONITORING WELL #3
SAMPLE TYPE : GROUNDWATER
SAMPLING DATE : APRIL 1, 2025
SAMPLING TIME : 15:08 HOUR
SAMPLING METHOD ° : SUBMERSIBLE PUMP
SAMPLING BY ° : MR KRIDSANAPONG NAMTHIP
ANALYZED BY : MISS KEWALEE SUKHAREE

RECEIVED DATE : APRIL 2, 2025
ANALYTICAL DATE : APRIL 2-14, 2025
ISSUE DATE : APRIL 18, 2025
REPORT NO. : 2025-U032581
WORK NO. : 2024-009408
ANALYSIS NO. : T25AH168-0003

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT	LIMIT OF QUANTITATION (LOQ)
			MONITORING WELL #3 T25AH168-0003			
COLOUR°	Pt-Co	VISUAL COMPARISON METHOD (SM: PART 2120 B)	10	-	-	5
ELECTRICAL CONDUCTIVITY°	µS/cm	ELECTRICAL CONDUCTIVITY METHOD (AT SITE) SM: PART 2510 B AND 1060 B	3,225 (31.6°C)	-	0.1	-
AMMONIA-NITROGEN°	mg/L NH ₃ -N	PHENATE METHOD (SM: PART 4500-NH ₃ F)	4.74	-	0.04	0.15
CYANIDE°	µg/L CN	DISTILLATION, PYRIDINE-BARBITURIC ACID METHOD (SM: PART 4500-CN C AND PART 4500-CN E)	ND	≤ 200	5	20
NITRATE NITROGEN°	mg/L NO ₃ -N	CADMIUM REDUCTION METHOD (SM: PART 4500-NO ₃ E)	< 0.10	-	0.02	0.10
PHENOLS°	mg/L	DISTILLATION, 4-AMINOANTIPYRINE METHOD (SM: PART 5530 B AND PART 5530 C)	ND	-	0.001	0.005
TOTAL PHOSPHATE°	mg/L PO ₄ ³⁻	PERSULPHATE DIGESTION AND ASCORBIC ACID METHOD (SM: PART 4500-P B AND PART 4500-P E)	0.15	-	0.03	0.15
CHLORIDE°	mg/L Cl	ARGENTOMETRIC METHOD (SM: 4500-Cl B)	315	-	0.5	2.0
SULPHATE°	mg/L SO ₄ ²⁻	TURBIDIMETRIC METHOD (SM: PART 4500-SO ₄ ²⁻ E)	618	-	1.0	4.0
ALKALINITY°	mg/L as CaCO ₃	TITRATION METHOD (SM: PART 2320 B)	291	-	-	-



PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT	LIMIT OF QUANTITATION (LOQ)
			MONITORING WELL #3 T25AH168-0003			
METALS						
MERCURY ^b	mg/L Hg	IN-HOUSE METHOD: UAE.TP.HEM.002 BASED ON SM: PART 3112 B	ND	≤ 0.001	0.0001	0.0005
SODIUM ^c	mg/L Na	NITRIC ACID-HYDROCHLORIC ACID DIGESTION AND INDUCTIVELY COUPLED PLASMA (ICP) METHOD (SM: PART 3030 F AND PART 3120 B)	482	-	0.005	-
SAMPLE CONDITION						
WATER'S COLOUR/TURBID			YELLOW/CLEAR			
SEDIMENT			BROWN			

^a : ISO/IEC 17025 ACCREDITED BY THAI INDUSTRIAL STANDARDS INSTITUTE (TISI)

^b : ISO/IEC 17025 ACCREDITED BY DEPARTMENT OF SCIENCE SERVICE (DSS)

^c : VERIFIED BY OWN LABORATORY QUALITY SYSTEM, BUT NOT IN SCOPE OF ACCREDITATION

SM : STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 24th EDITION, 2023.

REGULATORY STANDARD : NOTIFICATION OF THE NATIONAL ENVIRONMENTAL BOARD, NO.20, B.E.2543.

ND : NOT DETECTED.

Bhuchonk

(MR BHUCHONK PANICHLERTUMPI)
LABORATORY SUPERVISOR

ANALYSIS REPORT

CUSTOMER NAME	: DOUBLE A (1991) PUBLIC CO.,LTD (PULP 1)	RECEIVED DATE	: APRIL 2, 2025
ADDRESS	: 1 MOO 2 THA TUM SI MAHA PHOT PRACHIN BURI 25140	ANALYTICAL DATE	: APRIL 2-14, 2025
CONTACT INFORMATION	: TEL : 08 5835 1371 e-mail : kunnapat_p@doublea1991.com	ISSUE DATE	: APRIL 22, 2025
SAMPLING SOURCE	: MONITORING WELL #4	REPORT NO.	: 2025-U032582
SAMPLE TYPE	: GROUNDWATER	WORK NO.	: 2024-009408
SAMPLING DATE	: APRIL 1, 2025	ANALYSIS NO.	: T25AH168-0004
SAMPLING TIME	: 14:55 HOUR		
SAMPLING METHOD °	: SUBMERSIBLE PUMP		
SAMPLING BY °	: MR KRIDSANAPONG NAMTHIP		
ANALYZED BY	: MISS KEWALEE SUKHAREE		

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT	LIMIT OF QUANTITATION (LOQ)
			MONITORING WELL #4 T25AH168-0004			
COLOUR ^c	Pt-Co	VISUAL COMPARISON METHOD (SM: PART 2120 B)	15	-	-	5
ELECTRICAL CONDUCTIVITY ^c	µS/cm	ELECTRICAL CONDUCTIVITY METHOD (AT SITE) SM: PART 2510 B AND 1060 B	3,400 (32.0°C)	-	0.1	-
AMMONIA-NITROGEN ^b	mg/L NH ₃ -N	PHENATE METHOD (SM: PART 4500-NH ₃ F)	5.27	-	0.04	0.15
CYANIDE ^c	µg/L CN	DISTILLATION, PYRIDINE-BARBITURIC ACID METHOD (SM: PART 4500-CN C AND PART 4500-CN E)	ND	≤ 200	5	20
NITRATE NITROGEN ^b	mg/L NO ₃ -N	CADMIUM REDUCTION METHOD (SM: PART 4500-NO ₃ E)	0.59	-	0.02	0.10
PHENOLS ^c	mg/L	DISTILLATION, 4-AMINOANTIPYRINE METHOD (SM: PART 5530 B AND PART 5530 C)	ND	-	0.001	0.005
TOTAL PHOSPHATE ^c	mg/L PO ₄ ³⁻	PERSULPHATE DIGESTION AND ASCORBIC ACID METHOD (SM: PART 4500-P B AND PART 4500-P E)	0.15	-	0.03	0.15
CHLORIDE ^a	mg/L Cl	ARGENTOMETRIC METHOD (SM: 4500-Cl B)	355	-	0.5	2.0
SULPHATE ^c	mg/L SO ₄ ²⁻	TURBIDIMETRIC METHOD (SM: PART 4500-SO ₄ ²⁻ E)	701	-	1.0	4.0
ALKALINITY ^c	mg/L as CaCO ₃	TITRATION METHOD (SM: PART 2320 B)	278	-	-	-



PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT	LIMIT OF QUANTITATION (LOQ)
			MONITORING WELL #4 T25AH168-0004			
METALS						
MERCURY ^b	mg/L Hg	IN-HOUSE METHOD: UAE.TP.HEM.002 BASED ON SM: PART 3112 B	ND	≤ 0.001	0.0001	0.0005
SODIUM ^c	mg/L Na	NITRIC ACID-HYDROCHLORIC ACID DIGESTION AND INDUCTIVELY COUPLED PLASMA (ICP) METHOD (SM: PART 3030 F AND PART 3120 B)	449	-	0.005	-
SAMPLE CONDITION						
WATER'S COLOUR/TURBID SEDIMENT			YELLOW/TURBID BROWN			

^a : ISO/IEC 17025 ACCREDITED BY THAI INDUSTRIAL STANDARDS INSTITUTE (TISI)

^b : ISO/IEC 17025 ACCREDITED BY DEPARTMENT OF SCIENCE SERVICE (DSS)

^c : VERIFIED BY OWN LABORATORY QUALITY SYSTEM, BUT NOT IN SCOPE OF ACCREDITATION

SM : STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 24th EDITION, 2023.

REGULATORY STANDARD : NOTIFICATION OF THE NATIONAL ENVIRONMENTAL BOARD, NO.20, B.E.2543.

ND : NOT DETECTED.

Bhuchonk p.

(MR BHUCHONK PANICHLERTUMPI)
LABORATORY SUPERVISOR

ANALYSIS REPORT

CUSTOMER NAME	: DOUBLE A (1991) PUBLIC CO.,LTD (PULP 1)	RECEIVED DATE	: MAY 7, 2025
ADDRESS	: 1 MOO 2 THA TUM SI MAHA PHOT PRACHIN BURI 25140	ANALYTICAL DATE	: MAY 7-15, 2025
CONTACT INFORMATION	: TEL : 08 5835 1371 e-mail : kunnapat_p@doublea1991.com	ISSUE DATE	: MAY 20, 2025
SAMPLING SOURCE	: MONITORING WELL #1	REPORT NO.	: 2025-U043616
SAMPLE TYPE	: GROUNDWATER	WORK NO.	: 2024-009408
SAMPLING DATE	: MAY 6, 2025	ANALYSIS NO.	: T25AJ590-0001
SAMPLING TIME	: 15:30 HOUR		
SAMPLING METHOD °	: SUBMERSIBLE PUMP		
SAMPLING BY °	: MR KRIDSANAPONG NAMTHIP		
ANALYZED BY	: MISS KEWALEE SUKHAREE		

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT	LIMIT OF QUANTITATION (LOQ)
			MONITORING WELL #1 T25AJ590-0001			
COLOUR [°]	Pt-Co	VISUAL COMPARISON METHOD (SM: PART 2120 B)	< 5	-	-	5
ELECTRICAL CONDUCTIVITY [°]	µS/cm	ELECTRICAL CONDUCTIVITY METHOD (AT SITE) SM: PART 2510 B AND 1060 B	3,139 (30.3°C)	-	0.1	-
AMMONIA-NITROGEN [°]	mg/L NH ₃ -N	PHENATE METHOD (SM: PART 4500-NH ₃ F)	1.64	-	0.04	0.15
CYANIDE [°]	µg/L CN ⁻	DISTILLATION, PYRIDINE-BARBITURIC ACID METHOD (SM: PART 4500-CN C AND PART 4500-CN E)	ND	≤ 200	5	20
NITRATE NITROGEN [°]	mg/L NO ₃ -N	CADMIUM REDUCTION METHOD (SM: PART 4500-NO ₃ E)	< 0.10	-	0.02	0.10
PHENOLS [°]	mg/L	DISTILLATION, 4-AMINOANTIPYRINE METHOD (SM: PART 5530 B AND PART 5530 C)	ND	-	0.001	0.005
TOTAL PHOSPHATE [°]	mg/L PO ₄ ³⁻	PERSULPHATE DIGESTION AND ASCORBIC ACID METHOD (SM: PART 4500-P B AND PART 4500-P E)	< 0.15	-	0.03	0.15
CHLORIDE [°]	mg/L Cl ⁻	ARGENTOMETRIC METHOD (SM: 4500 -Cl B)	269	-	0.5	2.0
SULPHATE [°]	mg/L SO ₄ ²⁻	TURBIDIMETRIC METHOD (SM: PART 4500-SO ₄ ²⁻ E)	734	-	10	4.0
ALKALINITY [°]	mg/L as CaCO ₃	TITRATION METHOD (SM: PART 2320 B)	145	-	-	-



PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT	LIMIT OF QUANTITATION (LOQ)
			MONITORING WELL #1 T25AJ590-0001			
METALS						
MERCURY ^b	mg/L Hg	IN-HOUSE METHOD: UAE.TP.HEM.002 BASED ON SM: PART 3112 B	ND	≤ 0.001	0.0001	0.0005
SODIUM ^c	mg/L Na	NITRIC ACID-HYDROCHLORIC ACID DIGESTION AND INDUCTIVELY COUPLED PLASMA (ICP) METHOD (SM: PART 3030 F AND PART 3120 B)	358	-	0.005	-
SAMPLE CONDITION						
WATER'S COLOUR/TURBID SEDIMENT			YELLOW/TURBID BROWN			

^a : ISO/IEC 17025 ACCREDITED BY THAI INDUSTRIAL STANDARDS INSTITUTE (TISI)

^b : ISO/IEC 17025 ACCREDITED BY DEPARTMENT OF SCIENCE SERVICE (DSS)

^c : VERIFIED BY OWN LABORATORY QUALITY SYSTEM, BUT NOT IN SCOPE OF ACCREDITATION

SM : STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 24th EDITION, 2023.

REGULATORY STANDARD : NOTIFICATION OF THE NATIONAL ENVIRONMENTAL BOARD, NO.20, B.E.2543.

ND : NOT DETECTED.

Bhuchonk p.

(MR BHUCHONK PANICHLERTUMPI)
LABORATORY SUPERVISOR

ANALYSIS REPORT

CUSTOMER NAME : DOUBLE A (1991) PUBLIC CO.,LTD (PULP 1)
ADDRESS : 1 MOO 2 THA TUM SI MAHA PHOT PRACHIN BURI 25140
CONTACT INFORMATION : TEL : 08 5835 1371 e-mail : kunnapat_p@doublea1991.com
SAMPLING SOURCE : MONITORING WELL #2
SAMPLE TYPE : GROUNDWATER
SAMPLING DATE : MAY 6, 2025
SAMPLING TIME : 15:15 HOUR
SAMPLING METHOD ° : SUBMERSIBLE PUMP
SAMPLING BY ° : MR KRIDSANAPONG NAMTHIP
ANALYZED BY : MISS KEWALEE SUKHAREE

RECEIVED DATE : MAY 7, 2025
ANALYTICAL DATE : MAY 7-15, 2025
ISSUE DATE : MAY 20, 2025
REPORT NO. : 2025-U043617
WORK NO. : 2024-009408
ANALYSIS NO. : T25AJ590-0002

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT	LIMIT OF QUANTITATION (LOQ)
			MONITORING WELL #2 T25AJ590-0002			
COLOUR°	Pt-Co	VISUAL COMPARISON METHOD (SM: PART 2120 B)	5	-	-	5
ELECTRICAL CONDUCTIVITY°	µS/cm	ELECTRICAL CONDUCTIVITY METHOD (AT SITE) SM: PART 2510 B AND 1060 B	3,177 (29.2°C)	-	0.1	-
AMMONIA-NITROGEN°	mg/L NH ₃ -N	PHENATE METHOD (SM: PART 4500-NH ₃ F)	2.78	-	0.04	0.15
CYANIDE°	µg/L CN	DISTILLATION, PYRIDINE-BARBITURIC ACID METHOD (SM: PART 4500-CN: C AND PART 4500-CN: E)	ND	≤ 200	5	20
NITRATE NITROGEN°	mg/L NO ₃ -N	CADMIUM REDUCTION METHOD (SM: PART 4500-NO ₃ : E)	ND	-	0.02	0.10
PHENOLS°	mg/L	DISTILLATION, 4-AMINOANTIPYRINE METHOD (SM: PART 5530 B AND PART 5530 C)	< 0.005	-	0.001	0.005
TOTAL PHOSPHATE°	mg/L PO ₄ ³⁻	PERSULPHATE DIGESTION AND ASCORBIC ACID METHOD (SM: PART 4500-P B AND PART 4500-P E)	< 0.15	-	0.03	0.15
CHLORIDE ^A	mg/L Cl ⁻	ARGENTOMETRIC METHOD (SM: 4500-Cl B)	316	-	0.5	2.0
SULPHATE°	mg/L SO ₄ ²⁻	TURBIDIMETRIC METHOD (SM: PART 4500-SO ₄ ²⁻ E)	643	-	10	4.0
ALKALINITY°	mg/L as CaCO ₃	TITRATION METHOD (SM: PART 2320 B)	235	-	-	-



PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT	LIMIT OF QUANTITATION (LOQ)
			MONITORING WELL #2 T25AJ590-0002			
METALS						
MERCURY ^b	mg/L Hg	IN-HOUSE METHOD: UAE.TP.HEM.002 BASED ON SM: PART 3112 B	ND	≤ 0.001	0.0001	0.0005
SODIUM ^c	mg/L Na	NITRIC ACID-HYDROCHLORIC ACID DIGESTION AND INDUCTIVELY COUPLED PLASMA (ICP) METHOD (SM: PART 3030 F AND PART 3120 B)	327	-	0.005	-
SAMPLE CONDITION						
WATER'S COLOUR/TURBID			YELLOW/CLEAR			
SEDIMENT			BROWN			

^a : ISO/IEC 17025 ACCREDITED BY THAI INDUSTRIAL STANDARDS INSTITUTE (TISI)

^b : ISO/IEC 17025 ACCREDITED BY DEPARTMENT OF SCIENCE SERVICE (DSS)

^c : VERIFIED BY OWN LABORATORY QUALITY SYSTEM, BUT NOT IN SCOPE OF ACCREDITATION

SM : STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 24th EDITION, 2023.

REGULATORY STANDARD : NOTIFICATION OF THE NATIONAL ENVIRONMENTAL BOARD, NO.20, B.E.2543.

ND : NOT DETECTED.

Bhuchonk p.

(MR BHUCHONK PANICHLERTUMPI)
LABORATORY SUPERVISOR

ANALYSIS REPORT

CUSTOMER NAME : DOUBLE A (1991) PUBLIC CO.,LTD (PULP 1)
ADDRESS : 1 MOO 2 THA TUM SI MAHA PHOT PRACHIN BURI 25140
CONTACT INFORMATION : TEL : 08 5835 1371 e-mail : kunnapat_p@doublea1991.com
SAMPLING SOURCE : MONITORING WELL #3
SAMPLE TYPE : GROUNDWATER
SAMPLING DATE : MAY 6, 2025
SAMPLING TIME : 15:00 HOUR
SAMPLING METHOD ° : SUBMERSIBLE PUMP
SAMPLING BY ° : MR KRIDSANAPONG NAMTHIP
ANALYZED BY : MISS KEWALEE SUKHAREE

RECEIVED DATE : MAY 7, 2025
ANALYTICAL DATE : MAY 7-15, 2025
ISSUE DATE : MAY 20, 2025
REPORT NO. : 2025-U043618
WORK NO. : 2024-009408
ANALYSIS NO. : T25AJ590-0003

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT	LIMIT OF QUANTITATION (LOQ)
			MONITORING WELL #3 T25AJ590-0003			
COLOUR°	Pt-Co	VISUAL COMPARISON METHOD (SM: PART 2120 B)	5	-	-	5
ELECTRICAL CONDUCTIVITY°	µS/cm	ELECTRICAL CONDUCTIVITY METHOD (AT SITE) SM: PART 2510 B AND 1060 B	3,227 (30.8°C)	-	0.1	-
AMMONIA-NITROGEN°	mg/L NH ₃ -N	PHENATE METHOD (SM: PART 4500-NH ₃ F)	2.07	-	0.04	0.15
CYANIDE°	µg/L CN	DISTILLATION, PYRIDINE-BARBITURIC ACID METHOD (SM: PART 4500-CN C AND PART 4500-CN E)	ND	≤ 200	5	20
NITRATE NITROGEN°	mg/L NO ₃ -N	CADMIUM REDUCTION METHOD (SM: PART 4500-NO ₃ E)	< 0.10	-	0.02	0.10
PHENOLS°	mg/L	DISTILLATION, 4-AMINOANTIPYRINE METHOD (SM: PART 5530 B AND PART 5530 C)	ND	-	0.001	0.005
TOTAL PHOSPHATE°	mg/L PO ₄ ³⁻	PERSULPHATE DIGESTION AND ASCORBIC ACID METHOD (SM: PART 4500-P B AND PART 4500-P E)	< 0.15	-	0.03	0.15
CHLORIDE°	mg/L Cl	ARGENTOMETRIC METHOD (SM: 4500 -Cl B)	328	-	0.5	2.0
SULPHATE°	mg/L SO ₄ ²⁻	TURBIDIMETRIC METHOD (SM: PART 4500-SO ₄ ²⁻ E)	636	-	1.0	4.0
ALKALINITY°	mg/L as CaCO ₃	TITRATION METHOD (SM: PART 2320 B)	281	-	-	-



PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT	LIMIT OF QUANTITATION (LOQ)
			MONITORING WELL #3 T25AJ590-0003			
METALS						
MERCURY ^b	mg/L Hg	IN-HOUSE METHOD: UAE.TP.HEM.002 BASED ON SM: PART 3112 B	ND	≤ 0.001	0.0001	0.0005
SODIUM ^c	mg/L Na	NITRIC ACID-HYDROCHLORIC ACID DIGESTION AND INDUCTIVELY COUPLED PLASMA (ICP) METHOD (SM: PART 3030 F AND PART 3120 B)	316	-	0.005	-
SAMPLE CONDITION						
WATER'S COLOUR/TURBID			YELLOW/CLEAR			
SEDIMENT			BROWN			

^a : ISO/IEC 17025 ACCREDITED BY THAI INDUSTRIAL STANDARDS INSTITUTE (TISI)

^b : ISO/IEC 17025 ACCREDITED BY DEPARTMENT OF SCIENCE SERVICE (DSS)

^c : VERIFIED BY OWN LABORATORY QUALITY SYSTEM, BUT NOT IN SCOPE OF ACCREDITATION

SM : STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 24th EDITION, 2023.

REGULATORY STANDARD : NOTIFICATION OF THE NATIONAL ENVIRONMENTAL BOARD, NO.20, B.E.2543.

ND : NOT DETECTED.

Bhuchonk

(MR BHUCHONK PANICHLERTUMPI)
LABORATORY SUPERVISOR

ANALYSIS REPORT

CUSTOMER NAME	: DOUBLE A (1991) PUBLIC CO.,LTD (PULP 1)	RECEIVED DATE	: MAY 7, 2025
ADDRESS	: 1 MOO 2 THA TUM SI MAHA PHOT PRACHIN BURI 25140	ANALYTICAL DATE	: MAY 7-15, 2025
CONTACT INFORMATION	: TEL : 08 5835 1371 e-mail : kunnapat_p@doublea1991.com	ISSUE DATE	: MAY 20, 2025
SAMPLING SOURCE	: MONITORING WELL #4	REPORT NO.	: 2025-U043619
SAMPLE TYPE	: GROUNDWATER	WORK NO.	: 2024-009408
SAMPLING DATE	: MAY 6, 2025	ANALYSIS NO.	: T25AJ590-0004
SAMPLING TIME	: 14:40 HOUR		
SAMPLING METHOD °	: SUBMERSIBLE PUMP		
SAMPLING BY °	: MR KRIDSANAPONG NAMTHIP		
ANALYZED BY	: MISS KEWALEE SUKHAREE		

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT	LIMIT OF QUANTITATION (LOQ)
			MONITORING WELL #4 T25AJ590-0004			
COLOUR°	Pt-Co	VISUAL COMPARISON METHOD (SM: PART 2120 B)	10	-	-	5
ELECTRICAL CONDUCTIVITY°	µS/cm	ELECTRICAL CONDUCTIVITY METHOD (AT SITE) SM: PART 2510 B AND 1060 B	3,402 (31.2°C)	-	0.1	-
AMMONIA-NITROGEN°	mg/L NH ₃ -N	PHENATE METHOD (SM: PART 4500-NH ₃ F)	3.04	-	0.04	0.15
CYANIDE°	µg/L CN	DISTILLATION, PYRIDINE-BARBITURIC ACID METHOD (SM: PART 4500-CN C AND PART 4500-CN E)	ND	≤ 200	5	20
NITRATE NITROGEN°	mg/L NO ₃ -N	CADMIUM REDUCTION METHOD (SM: PART 4500-NO ₃ E)	ND	-	0.02	0.10
PHENOLS°	mg/L	DISTILLATION, 4-AMINOANTIPYRINE METHOD (SM: PART 5530 B AND PART 5530 C)	< 0.005	-	0.001	0.005
TOTAL PHOSPHATE°	mg/L PO ₄ ³⁻	PERSULPHATE DIGESTION AND ASCORBIC ACID METHOD (SM: PART 4500-P B AND PART 4500-P E)	< 0.15	-	0.03	0.15
CHLORIDE°	mg/L Cl	ARGENTOMETRIC METHOD (SM: 4500 -Cl B)	364	-	0.5	2.0
SULPHATE°	mg/L SO ₄ ²⁻	TURBIDIMETRIC METHOD (SM: PART 4500-SO ₄ ²⁻ E)	650	-	1.0	4.0
ALKALINITY°	mg/L as CaCO ₃	TITRATION METHOD (SM: PART 2320 B)	264	-	-	-



PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT	LIMIT OF QUANTITATION (LOQ)
			MONITORING WELL #4 T25AJ590-0004			
METALS						
MERCURY ^b	mg/L Hg	IN-HOUSE METHOD: UAE.TP.HEM.002 BASED ON SM: PART 3112 B	ND	≤ 0.001	0.0001	0.0005
SODIUM ^c	mg/L Na	NITRIC ACID-HYDROCHLORIC ACID DIGESTION AND INDUCTIVELY COUPLED PLASMA (ICP) METHOD (SM: PART 3030 F AND PART 3120 B)	342	-	0.005	-
SAMPLE CONDITION						
WATER'S COLOUR/TURBID			YELLOW/CLEAR			
SEDIMENT			BROWN			

^a : ISO/IEC 17025 ACCREDITED BY THAI INDUSTRIAL STANDARDS INSTITUTE (TISI)

^b : ISO/IEC 17025 ACCREDITED BY DEPARTMENT OF SCIENCE SERVICE (DSS)

^c : VERIFIED BY OWN LABORATORY QUALITY SYSTEM, BUT NOT IN SCOPE OF ACCREDITATION

SM : STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 24th EDITION, 2023.

REGULATORY STANDARD : NOTIFICATION OF THE NATIONAL ENVIRONMENTAL BOARD, NO.20, B.E.2543.

ND : NOT DETECTED.

Bhuchonk

(MR. BHUCHONK PANICHLERTUMPI)
LABORATORY SUPERVISOR

ANALYSIS REPORT

CUSTOMER NAME	: DOUBLE A (1991) PUBLIC CO.,LTD (PULP 1)	RECEIVED DATE	: JUNE 6, 2025
ADDRESS	: 1 MOO 2 THA TUM SI MAHA PHOT PRACHIN BURI 25140	ANALYTICAL DATE	: JUNE 6-17, 2025
CONTACT INFORMATION	: TEL : 08 5835 1371 e-mail : kunnapat_p@doublea1991.com	ISSUE DATE	: JUNE 18, 2025
SAMPLING SOURCE	: MONITORING WELL #1	REPORT NO.	: 2025-U054488
SAMPLE TYPE	: GROUNDWATER	WORK NO.	: 2024-009408
SAMPLING DATE	: JUNE 6, 2025	ANALYSIS NO.	: T25AM189-0001
SAMPLING TIME	: 10:00 HOUR		
SAMPLING METHOD °	: SUBMERSIBLE PUMP		
SAMPLING BY °	: MR KRIDSANAPONG NAMTHIP		
ANALYZED BY	: MISS NADNAPA KAMOLBOON		

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT	LIMIT OF QUANTITATION (LOQ)
			MONITORING WELL #1 T25AM189-0001			
COLOUR ^c	Pt-Co	VISUAL COMPARISON METHOD (SM: PART 2120 B)	10	-	-	5
ELECTRICAL CONDUCTIVITY ^c	µS/cm	ELECTRICAL CONDUCTIVITY METHOD (AT SITE) SM: PART 2510 B AND 1060 B	3,581 (30.1°C)	-	0.1	-
AMMONIA-NITROGEN ^c	mg/L NH ₃ -N	PHENATE METHOD (SM: PART 4500-NH ₃ F)	1.62	-	0.04	0.15
CYANIDE ^c	µg/L CN	DISTILLATION, PYRIDINE-BARBITURIC ACID METHOD (SM: PART 4500-CN C AND PART 4500-CN E)	ND	≤ 200	5	20
NITRATE NITROGEN ^c	mg/L NO ₃ -N	CADMIUM REDUCTION METHOD (SM: PART 4500-NO ₃ E)	ND	-	0.02	0.10
PHENOLS ^c	mg/L	DISTILLATION, 4-AMINOANTIPYRINE METHOD (SM: PART 5530 B AND PART 5530 C)	< 0.005	-	0.001	0.005
TOTAL PHOSPHATE ^c	mg/L PO ₄ ³⁻	PERSULPHATE DIGESTION AND ASCORBIC ACID METHOD (SM: PART 4500-P B AND PART 4500-P E)	ND	-	0.03	0.15
CHLORIDE ^a	mg/L Cl	ARGENTOMETRIC METHOD (SM: 4500-Cl B)	297	-	0.5	2.0
SULPHATE ^c	mg/L SO ₄ ²⁻	TURBIDIMETRIC METHOD (SM: PART 4500-SO ₄ ²⁻ E)	935	-	1.0	4.0
ALKALINITY ^c	mg/L as CaCO ₃	TITRATION METHOD (SM: PART 2320 B)	157	-	-	-



PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT	LIMIT OF QUANTITATION (LOQ)
			MONITORING WELL #1 T25AM189-0001			
METALS						
MERCURY ^b	mg/L Hg	IN-HOUSE METHOD: UAE.TP.HEM.002 BASED ON SM: PART 3112 B	< LOQ	≤ 0.001	0.0001	0.0005
SODIUM ^c	mg/L Na	NITRIC ACID-HYDROCHLORIC ACID DIGESTION AND INDUCTIVELY COUPLED PLASMA (ICP) METHOD (SM: PART 3030 F AND PART 3120 B)	333	-	0.005	-
SAMPLE CONDITION						
WATER'S COLOUR/TURBID			YELLOW/TURBID			
SEDIMENT			BROWN			

^a : ISO/IEC 17025 ACCREDITED BY THAI INDUSTRIAL STANDARDS INSTITUTE (TISI)

^b : ISO/IEC 17025 ACCREDITED BY DEPARTMENT OF SCIENCE SERVICE (DSS)

^c : VERIFIED BY OWN LABORATORY QUALITY SYSTEM, BUT NOT IN SCOPE OF ACCREDITATION

SM : STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 24th EDITION, 2023.

REGULATORY STANDARD : NOTIFICATION OF THE NATIONAL ENVIRONMENTAL BOARD, NO.20, B.E.2543.

ND : NOT DETECTED.

< LOQ : < LIMIT OF QUANTITATION (MERCURY ≥ 0.0001 AND < 0.0005 mg/L).

Benjawan V.

(MISS BENJAWAN VIRIYOTHAI)
LABORATORY SUPERVISOR

ANALYSIS REPORT

CUSTOMER NAME : DOUBLE A (1991) PUBLIC CO.,LTD (PULP 1)
ADDRESS : 1 MOO 2 THA TUM SI MAHA PHOT PRACHIN BURI 25140
CONTACT INFORMATION : TEL : 08 5835 1371 e-mail : kunnapat_p@doublea1991.com
SAMPLING SOURCE : MONITORING WELL #2
SAMPLE TYPE : GROUNDWATER
SAMPLING DATE : JUNE 6, 2025
SAMPLING TIME : 10:15 HOUR
SAMPLING METHOD ° : SUBMERSIBLE PUMP
SAMPLING BY ° : MR KRIDSANAPONG NAMTHIP
ANALYZED BY : MISS NADNAPA KAMOLBOON

RECEIVED DATE : JUNE 6, 2025
ANALYTICAL DATE : JUNE 6-17, 2025
ISSUE DATE : JUNE 18, 2025
REPORT NO. : 2025-U054494
WORK NO. : 2024-009408
ANALYSIS NO. : T25AM189-0002

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT	LIMIT OF QUANTITATION (LOQ)
			MONITORING WELL #2 T25AM189-0002			
COLOUR ^c	Pt-Co	VISUAL COMPARISON METHOD (SM: PART 2120 B)	5	-	-	5
ELECTRICAL CONDUCTIVITY ^c	µS/cm	ELECTRICAL CONDUCTIVITY METHOD (AT SITE) SM: PART 2510 B AND 1060 B	3,012 (30.9°C)	-	0.1	-
AMMONIA-NITROGEN ^c	mg/L NH ₃ -N	PHENATE METHOD (SM: PART 4500-NH ₃ F)	2.43	-	0.04	0.15
CYANIDE ^c	µg/L CN	DISTILLATION, PYRIDINE-BARBITURIC ACID METHOD (SM: PART 4500-CN C AND PART 4500-CN E)	ND	≤ 200	5	20
NITRATE NITROGEN ^c	mg/L NO ₃ -N	CADMIUM REDUCTION METHOD (SM: PART 4500-NO ₃ E)	< 0.10	-	0.02	0.10
PHENOLS ^c	mg/L	DISTILLATION, 4-AMINOANTIPYRINE METHOD (SM: PART 5530 B AND PART 5530 C)	< 0.005	-	0.001	0.005
TOTAL PHOSPHATE ^c	mg/L PO ₄ ³⁻	PERSULPHATE DIGESTION AND ASCORBIC ACID METHOD (SM: PART 4500-P B AND PART 4500-P E)	ND	-	0.03	0.15
CHLORIDE ^a	mg/L Cl	ARGENTOMETRIC METHOD (SM: 4500 -Cl B)	287	-	0.5	2.0
SULPHATE ^c	mg/L SO ₄ ²⁻	TURBIDIMETRIC METHOD (SM: PART 4500-SO ₄ ²⁻ E)	612	-	1.0	4.0
ALKALINITY ^c	mg/L as CaCO ₃	TITRATION METHOD (SM: PART 2320 B)	222	-	-	-



PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT	LIMIT OF QUANTITATION (LOQ)
			MONITORING WELL #2 T25AM189-0002			
METALS						
MERCURY ^b	mg/L Hg	IN-HOUSE METHOD: UAE.TP.HEM.002 BASED ON SM: PART 3112 B	ND	≤ 0.001	0.0001	0.0005
SODIUM ^c	mg/L Na	NITRIC ACID-HYDROCHLORIC ACID DIGESTION AND INDUCTIVELY COUPLED PLASMA (ICP) METHOD (SM: PART 3030 F AND PART 3120 B)	302	-	0.005	-
SAMPLE CONDITION						
WATER'S COLOUR/TURBID SEDIMENT			YELLOW/CLEAR BROWN			

^a : ISO/IEC 17025 ACCREDITED BY THAI INDUSTRIAL STANDARDS INSTITUTE (TISI)

^b : ISO/IEC 17025 ACCREDITED BY DEPARTMENT OF SCIENCE SERVICE (DSS)

^c : VERIFIED BY OWN LABORATORY QUALITY SYSTEM, BUT NOT IN SCOPE OF ACCREDITATION

SM : STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 24th EDITION, 2023.

REGULATORY STANDARD : NOTIFICATION OF THE NATIONAL ENVIRONMENTAL BOARD, NO.20, B.E.2543.

ND : NOT DETECTED.

Benjawan V.

(MISS BENJAWAN VIRIYOTHAI)
LABORATORY SUPERVISOR

ANALYSIS REPORT

CUSTOMER NAME : DOUBLE A (1991) PUBLIC CO.,LTD (PULP 1)
ADDRESS : 1 MOO 2 THA TUM SI MAHA PHOT PRACHIN BURI 25140
CONTACT INFORMATION : TEL : 08 5835 1371 e-mail : kunnapat_p@doublea1991.com
SAMPLING SOURCE : MONITORING WELL #3
SAMPLE TYPE : GROUNDWATER
SAMPLING DATE : JUNE 6, 2025
SAMPLING TIME : 09:50 HOUR
SAMPLING METHOD ° : SUBMERSIBLE PUMP
SAMPLING BY ° : MR KRIDSANAPONG NAMTHIP
ANALYZED BY : MISS NADNAPA KAMOLBOON

RECEIVED DATE : JUNE 6, 2025
ANALYTICAL DATE : JUNE 6-17, 2025
ISSUE DATE : JUNE 18, 2025
REPORT NO. : 2025-U054496
WORK NO. : 2024-009408
ANALYSIS NO. : T25AM189-0003

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT	LIMIT OF QUANTITATION (LOQ)
			MONITORING WELL #3 T25AM189-0003			
COLOUR ^c	Pt-Co	VISUAL COMPARISON METHOD (SM: PART 2120 B)	5	-	-	5
ELECTRICAL CONDUCTIVITY ^c	µS/cm	ELECTRICAL CONDUCTIVITY METHOD (AT SITE) SM: PART 2510 B AND 1060 B	2,980 (30.8°C)	-	0.1	-
AMMONIA-NITROGEN ^c	mg/L NH ₃ -N	PHENATE METHOD (SM: PART 4500-NH ₃ F)	5.21	-	0.04	0.15
CYANIDE ^c	µg/L CN	DISTILLATION, PYRIDINE-BARBITURIC ACID METHOD (SM: PART 4500-CN: C AND PART 4500-CN: E)	ND	≤ 200	5	20
NITRATE NITROGEN ^c	mg/L NO ₃ -N	CADMIUM REDUCTION METHOD (SM: PART 4500-NO ₃ E)	< 0.10	-	0.02	0.10
PHENOLS ^c	mg/L	DISTILLATION, 4-AMINOANTIPYRINE METHOD (SM: PART 5530 B AND PART 5530 C)	< 0.005	-	0.001	0.005
TOTAL PHOSPHATE ^c	mg/L PO ₄ ³⁻	PERSULPHATE DIGESTION AND ASCORBIC ACID METHOD (SM: PART 4500-P B AND PART 4500-P E)	ND	-	0.03	0.15
CHLORIDE ^a	mg/L Cl	ARGENTOMETRIC METHOD (SM: 4500-Cl B)	297	-	0.5	2.0
SULPHATE ^c	mg/L SO ₄ ²⁻	TURBIDIMETRIC METHOD (SM: PART 4500-SO ₄ ²⁻ E)	550	-	1.0	4.0
ALKALINITY ^c	mg/L as CaCO ₃	TITRATION METHOD (SM: PART 2320 B)	266	-	-	-



PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT	LIMIT OF QUANTITATION (LOQ)
			MONITORING WELL #3 T25AM189-0003			
METALS						
MERCURY ^b	mg/L Hg	IN-HOUSE METHOD: UAE.TP.HEM.002 BASED ON SM: PART 3112 B	ND	≤ 0.001	0.0001	0.0005
SODIUM ^c	mg/L Na	NITRIC ACID-HYDROCHLORIC ACID DIGESTION AND INDUCTIVELY COUPLED PLASMA (ICP) METHOD (SM: PART 3030 F AND PART 3120 B)	235	-	0.005	-
SAMPLE CONDITION						
WATER'S COLOUR/TURBID			YELLOW/CLEAR			
SEDIMENT			BROWN			

^a : ISO/IEC 17025 ACCREDITED BY THAI INDUSTRIAL STANDARDS INSTITUTE (TISI)

^b : ISO/IEC 17025 ACCREDITED BY DEPARTMENT OF SCIENCE SERVICE (DSS)

^c : VERIFIED BY OWN LABORATORY QUALITY SYSTEM, BUT NOT IN SCOPE OF ACCREDITATION

SM : STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 24th EDITION, 2023.

REGULATORY STANDARD : NOTIFICATION OF THE NATIONAL ENVIRONMENTAL BOARD, NO.20, B.E.2543.

ND : NOT DETECTED.

Benjawan V.

(MISS BENJAWAN VIRIYOTHAI)
LABORATORY SUPERVISOR

ANALYSIS REPORT

CUSTOMER NAME : DOUBLE A (1991) PUBLIC CO.,LTD (PULP 1)
ADDRESS : 1 MOO 2 THA TUM SI MAHA PHOT PRACHIN BURI 25140
CONTACT INFORMATION : TEL : 08 5835 1371 e-mail : kunnapat_p@doublea1991.com
SAMPLING SOURCE : MONITORING WELL #4
SAMPLE TYPE : GROUNDWATER
SAMPLING DATE : JUNE 6, 2025
SAMPLING TIME : 09:35 HOUR
SAMPLING METHOD ° : SUBMERSIBLE PUMP
SAMPLING BY ° : MR KRIDSANAPONG NAMTHIP
ANALYZED BY : MISS NADNAPA KAMOLBOON

RECEIVED DATE : JUNE 6, 2025
ANALYTICAL DATE : JUNE 6-17, 2025
ISSUE DATE : JUNE 18, 2025
REPORT NO. : 2025-U054497
WORK NO. : 2024-009408
ANALYSIS NO. : T25AM189-0004

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT	LIMIT OF QUANTITATION (LOQ)
			MONITORING WELL #4 T25AM189-0004			
COLOUR°	Pt-Co	VISUAL COMPARISON METHOD (SM: PART 2120 B)	10	-	-	5
ELECTRICAL CONDUCTIVITY°	µS/cm	ELECTRICAL CONDUCTIVITY METHOD (AT SITE) SM: PART 2510 B AND 1060 B	1,768 (31.2°C)	-	0.1	-
AMMONIA-NITROGEN°	mg/L NH ₃ -N	PHENATE METHOD (SM: PART 4500-NH ₃ F)	3.00	-	0.04	0.15
CYANIDE°	µg/L CN	DISTILLATION, PYRIDINE-BARBITURIC ACID METHOD (SM: PART 4500-CN C AND PART 4500-CN E)	ND	≤ 200	5	20
NITRATE NITROGEN°	mg/L NO ₃ -N	CADMIUM REDUCTION METHOD (SM: PART 4500-NO ₃ E)	0.10	-	0.02	0.10
PHENOLS°	mg/L	DISTILLATION, 4-AMINOANTIPYRINE METHOD (SM: PART 5530 B AND PART 5530 C)	< 0.005	-	0.001	0.005
TOTAL PHOSPHATE°	mg/L PO ₄ ³⁻	PERSULPHATE DIGESTION AND ASCORBIC ACID METHOD (SM: PART 4500-P B AND PART 4500-P E)	< 0.15	-	0.03	0.15
CHLORIDE°	mg/L Cl	ARGENTOMETRIC METHOD (SM: 4500-Cl B)	154	-	0.5	2.0
SULPHATE°	mg/L SO ₄ ²⁻	TURBIDIMETRIC METHOD (SM: PART 4500-SO ₄ ²⁻ E)	324	-	1.0	4.0
ALKALINITY°	mg/L as CaCO ₃	TITRATION METHOD (SM: PART 2320 B)	153	-	-	-



PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT	LIMIT OF QUANTITATION (LOQ)
			MONITORING WELL #4 T25AM189-0004			
METALS						
MERCURY ^b	mg/L Hg	IN-HOUSE METHOD: UAE.TP.HEM.002 BASED ON SM: PART 3112 B	ND	≤ 0.001	0.0001	0.0005
SODIUM ^c	mg/L Na	NITRIC ACID-HYDROCHLORIC ACID DIGESTION AND INDUCTIVELY COUPLED PLASMA (ICP) METHOD (SM: PART 3030 F AND PART 3120 B)	115	-	0.005	-
SAMPLE CONDITION						
WATER'S COLOUR/TURBID			YELLOW/TURBID			
SEDIMENT			BROWN			

^a : ISO/IEC 17025 ACCREDITED BY THAI INDUSTRIAL STANDARDS INSTITUTE (TISI)

^b : ISO/IEC 17025 ACCREDITED BY DEPARTMENT OF SCIENCE SERVICE (DSS)

^c : VERIFIED BY OWN LABORATORY QUALITY SYSTEM, BUT NOT IN SCOPE OF ACCREDITATION

SM : STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 24th EDITION, 2023.

REGULATORY STANDARD : NOTIFICATION OF THE NATIONAL ENVIRONMENTAL BOARD, NO.20, B.E.2543.

ND : NOT DETECTED.

Benjawan V.

(MISS BENJAWAN VIRIYOTHAI)
LABORATORY SUPERVISOR

ANALYSIS REPORT

CUSTOMER NAME : DOUBLE A (1991) PUBLIC CO.,LTD (PULP 1)
ADDRESS : 1 MOO 2 THA TUM SI MAHA PHOT PRACHIN BURI 25140
CONTACT INFORMATION : TEL : 08 5835 1371 e-mail : kunnapat_p@doublea1991.com
SAMPLING SOURCE : MONITORING WELL #5
SAMPLE TYPE : GROUNDWATER
SAMPLING DATE : JUNE 6, 2025
SAMPLING TIME : 09:20 HOUR
SAMPLING METHOD ° : SUBMERSIBLE PUMP
SAMPLING BY ° : MR KRIDSANAPONG NAMTHIP
ANALYZED BY : MISS NADNAPA KAMOLBOON

RECEIVED DATE : JUNE 6, 2025
ANALYTICAL DATE : JUNE 6-17, 2025
ISSUE DATE : JUNE 18, 2025
REPORT NO. : 2025-U054499
WORK NO. : 2024-009408
ANALYSIS NO. : T25AM189-0005

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT	LIMIT OF QUANTITATION (LOQ)
			MONITORING WELL #5 T25AM189-0005			
COLOUR°	Pt-Co	VISUAL COMPARISON METHOD (SM: PART 2120 B)	10	-	-	5
ELECTRICAL CONDUCTIVITY°	µS/cm	ELECTRICAL CONDUCTIVITY METHOD (AT SITE) SM: PART 2510 B AND 1060 B	3,140 (30.8°C)	-	0.1	-
AMMONIA-NITROGEN°	mg/L NH ₃ -N	PHENATE METHOD (SM: PART 4500-NH ₃ F)	5.46	-	0.04	0.15
CYANIDE°	µg/L CN	DISTILLATION, PYRIDINE-BARBITURIC ACID METHOD (SM: PART 4500-CN C AND PART 4500-CN E)	ND	≤ 200	5	20
NITRATE NITROGEN°	mg/L NO ₃ -N	CADMIUM REDUCTION METHOD (SM: PART 4500-NO ₃ E)	< 0.10	-	0.02	0.10
PHENOLS°	mg/L	DISTILLATION, 4-AMINOANTIPYRINE METHOD (SM: PART 5530 B AND PART 5530 C)	< 0.005	-	0.001	0.005
TOTAL PHOSPHATE°	mg/L PO ₄ ³⁻	PERSULPHATE DIGESTION AND ASCORBIC ACID METHOD (SM: PART 4500-P B AND PART 4500-P E)	< 0.15	-	0.03	0.15
CHLORIDE°	mg/L Cl	ARGENTOMETRIC METHOD (SM: 4500 -Cl B)	315	-	0.5	2.0
SULPHATE°	mg/L SO ₄ ²⁻	TURBIDIMETRIC METHOD (SM: PART 4500-SO ₄ ²⁻ E)	586	-	1.0	4.0
ALKALINITY°	mg/L as CaCO ₃	TITRATION METHOD (SM: PART 2320 B)	331	-	-	-



PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT	LIMIT OF QUANTITATION (LOQ)
			MONITORING WELL #5 T25AM189-0005			
METALS						
MERCURY ^b	mg/L Hg	IN-HOUSE METHOD: UAE.TP.HEM.002 BASED ON SM: PART 3112 B	ND	≤ 0.001	0.0001	0.0005
SODIUM ^c	mg/L Na	NITRIC ACID-HYDROCHLORIC ACID DIGESTION AND INDUCTIVELY COUPLED PLASMA (ICP) METHOD (SM: PART 3030 F AND PART 3120 B)	172	-	0.005	-
SAMPLE CONDITION						
WATER'S COLOUR/TURBID SEDIMENT			YELLOW/CLEAR BROWN			

^a : ISO/IEC 17025 ACCREDITED BY THAI INDUSTRIAL STANDARDS INSTITUTE (TISI)

^b : ISO/IEC 17025 ACCREDITED BY DEPARTMENT OF SCIENCE SERVICE (DSS)

^c : VERIFIED BY OWN LABORATORY QUALITY SYSTEM, BUT NOT IN SCOPE OF ACCREDITATION

SM : STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 24th EDITION, 2023.

REGULATORY STANDARD : NOTIFICATION OF THE NATIONAL ENVIRONMENTAL BOARD, NO.20, B.E.2543.

ND : NOT DETECTED.

Benjawan V.

(MISS BENJAWAN VIRIYOTHAI)
LABORATORY SUPERVISOR

กากของเสีย

ตรวจวัดโดยบริษัท ยูไนเต็ด แอนนาลิสต์ แอนด์ เอ็นจิเนียริง คอนซัลแตนท์ จำกัด

ANALYSIS REPORT

CUSTOMER NAME : DOUBLE A (1991) PUBLIC CO., LTD. (PULP1)
ADDRESS : 1 MOO 2, THATOOM, SRIMAHAPHOTE, PRACHINBURI THAILAND 25140.
CONTACT INFORMATION : TEL : 08 5835 1371 e-mail : kunnapat_p@doublea1991.com
SAMPLING SOURCE : SLUDGE ETP#1 (TTLIC)
SAMPLE TYPE : SLUDGE
SAMPLING DATE : APRIL 8, 2025
SAMPLING TIME : 11:45 HOUR
SAMPLING METHOD : GRAB
SAMPLING BY : MR PRACHCHAPOL SOPHA
ANALYZED BY : SC
RECEIVED DATE : APRIL 8, 2025
ANALYTICAL DATE : APRIL 8 - MAY 2, 2025
ISSUE DATE : MAY 9, 2025
REPORT NO. : 2025-U039869
WORK NO. : 2024-009408
ANALYSIS NO. : T25AH664-0001

ANALYTE	REPORT LOD (ng/kg)	AMOUNT (ng/kg)	TEF ^{1/}	TEQ ^{2/} (ng/kg)
2,3,7,8-TCDD	0.0500	< 0.0500	1	< 0.0500

ANALYSIS METHOD : US EPA, METHOD 8290A, FEBRUARY 2007

^{1/} TEF (TOXIC EQUIVALENCY FACTOR), USE IS ACCORDING TO NATO/CCMS (1988), AS AN INTERNATIONAL TOXIC EQUIVALENCY FACTORS (I-TEFS).

^{2/} TEQ (TOXIC EQUIVALENCY) FOR EACH COMPONENT OBTAINED BY MULTIPLYING THE CONCENTRATION WITH ITS CORRESPONDING TEF.

THE SAMPLING PROCEDURES AND APPROVAL ARE NOT INCLUDED

SC : THE TEST WAS SUBCONTRACTED TO THE ANOTHER LABORATORY.



(MRS PIYAPAT SUTTAMANUTWONG)
LABORATORY SUPERVISOR

ANALYSIS REPORT

CUSTOMER NAME : DOUBLE A (1991) PUBLIC CO., LTD. (PULP1)
ADDRESS : 1 MOO 2, THATOOM, SRIMAHAPHOTE, PRACHINBURI THAILAND 25140.
CONTACT INFORMATION : TEL : 08 5835 1371 e-mail : kunnapat_p@doublea1991.com
SAMPLING SOURCE : SLUDGE ETP#1 (STLC)
SAMPLE TYPE : SLUDGE
SAMPLING DATE : APRIL 8, 2025
SAMPLING TIME : 11:45 HOUR
SAMPLING METHOD : GRAB
SAMPLING BY : MR PRACHCHAPOL SOPHA
ANALYZED BY : SC
RECEIVED DATE : APRIL 8, 2025
ANALYTICAL DATE : APRIL 8 - MAY 2, 2025
ISSUE DATE : MAY 9, 2025
REPORT NO. : 2025-U039870
WORK NO. : 2024-009408
ANALYSIS NO. : T25AH664-0002

ANALYTE	REPORT LOD (ng/L)	AMOUNT (ng/L)	TEF ^{1/}	TEQ ^{2/} (ng/L)
2,3,7,8-TCDD	0.000500	< 0.000500	1	< 0.000500

ANALYSIS METHOD : US EPA, METHOD 8290A, FEBRUARY 2007

^{1/} TEF (TOXIC EQUIVALENCY FACTOR), USE IS ACCORDING TO NATO/CCMS (1988), AS AN INTERNATIONAL TOXIC EQUIVALENCY FACTORS (I-TEFS).

^{2/} TEQ (TOXIC EQUIVALENCY) FOR EACH COMPONENT OBTAINED BY MULTIPLYING THE CONCENTRATION WITH ITS CORRESPONDING TEF.

THE SAMPLING PROCEDURES AND APPROVAL ARE NOT INCLUDED

SC : THE TEST WAS SUBCONTRACTED TO THE ANOTHER LABORATORY.

Piyapat S.

(MRS PIYAPAT SUTTAMANUTWONG)

LABORATORY SUPERVISOR

ทรัพยากรนิเวศในน้ำ

ตรวจวัดโดยบริษัท ยูไนเต็ด แอนนาลิสต์ แอนด์ เอ็นจิเนียริง คอนซัลแตนท์ จำกัด

ANALYSIS REPORT

CUSTOMER NAME : DOUBLE A (1991) PUBLIC CO.,LTD (PULP 1)
ADDRESS : 1 MOO 2 THA TUM SI MAHA PHOT PRACHIN BURI 25140
CONTACT INFORMATION : TEL : 08 5835 1371 e-mail : kunnapat_p@doublea1991.com
SAMPLING SOURCE : -
SAMPLE TYPE : SURFACE WATER **RECEIVED DATE** : MARCH 4, 2025
SAMPLING DATE : MARCH 3, 2025 **ANALYTICAL DATE** : MARCH 4-14, 2025
SAMPLING TIME : * **ISSUE DATE** : MARCH 18, 2025
SAMPLING METHOD ° : PLANKTON NET **REPORT NO.** : 2025-U022259
SAMPLING BY ° : MR KRIDSANAPONG NAMTHIP **WORK NO.** : 2024-009408
ANALYZED BY : MISS NAPAPORN PURATAKO **ANALYSIS NO.** : T25AE493-0002, T25AE493-0005

PHYTOPLANKTON (Natural Units/mL)	COUNTING UNIT	RESULT ¹	
		SAMPLE NO. 1 11:10 HOUR * T25AE493-0002	SAMPLE NO. 2 13:15 HOUR * T25AE493-0005
Division Cyanophyta			
Class Cyanophyceae			
Family Chroococcaceae			
<i>Microcystis aeruginosa</i> °	COLONY	0	438
Family Oscillatoriaceae			
<i>Oscillatoria</i> spp. °	FILAMENT	4,408	8,840
<i>Spirulina</i> spp. °	FILAMENT	14	220
Division Chlorophyta			
Class Chlorophyceae			
Family Chlamydomonadaceae			
<i>Gonium</i> spp. °	COLONY	10	19
<i>Pandorina morum</i> °	COLONY	15	37
Family Coccomyxaceae			
<i>Elakatothrix gelatinosa</i> °	COLONY	0	14
Family Hydrodictyaceae			
<i>Pediastrum</i> spp. °	COLONY	38	69
Family Coelastraceae			
<i>Coelastrum</i> spp. °	COLONY	89	123
Family Oocystaceae			
<i>Ankistrodesmus</i> spp. °	COLONY	27	38
<i>Dictyosphaerium</i> spp. °	COLONY	97	146
<i>Kirchneriella</i> spp. °	COLONY	77	100
<i>Tetraedron</i> spp. °	CELL	11	22
Family Scenedesmaceae			
<i>Actinastrum</i> spp. °	COLONY	675	1,440
<i>Micractinium</i> spp. °	COLONY	31	26
<i>Crucigenia</i> spp. °	COLONY	12	11
<i>Scenedesmus</i> spp. °	COLONY	313	399



PHYTOPLANKTON (Natural Units/mL)	COUNTING UNIT	RESULT ¹	
		SAMPLE NO. 1 11:10 HOUR * T25AE493-0002	SAMPLE NO. 2 13:15 HOUR * T25AE493-0005
Family Desmidiaceae			
<i>Closterium</i> spp. ^c	CELL	23	20
<i>Cosmarium</i> spp. ^c	CELL	10	19
<i>Staurastrum</i> spp. ^c	CELL	2,641	4,884
Class Euglenophyceae			
Family Euglenaceae			
<i>Euglena</i> spp. ^b	CELL	53	45
<i>Phacus</i> spp. ^b	CELL	26	63
<i>Strombomonas</i> spp. ^c	CELL	52	39
<i>Trachelomonas hispida</i> ^c	CELL	16	28
<i>T. volvocina</i> ^c	CELL	47	63
Division Chromophyta			
Class Bacillariophyceae			
Family Thalassiosiraceae			
<i>Cyclotella</i> spp. ^c	CELL	11	0
Family Aulacoseiraceae			
<i>Aulacoseira granulata</i> ^c	FILAMENT	3,889	7,538
Family Fragilariaceae			
<i>Synedra rumpens</i> ^c	CELL	117	165
<i>S. ulna</i> ^c	CELL	21	35
Family Naviculaceae			
<i>Gyrosigma</i> spp. ^c	CELL	12	25
<i>Navicula</i> spp. ^c	CELL	67	100
Family Surirellaceae			
<i>Surirella</i> spp. ^c	CELL	314	267
Class Chrysophyceae			
Family Centritracteaceae			
<i>Centritractus</i> spp. ^c	CELL	16	42
Family Pleurochloridaceae			
<i>Isthmochloron</i> spp. ^c	CELL	51	80

PHYTOPLANKTON (Natural Units/mL)	COUNTING UNIT	RESULT ¹	
		SAMPLE NO. 1 11:10 HOUR * T25AE493-0002	SAMPLE NO. 2 13:15 HOUR * T25AE493-0005
Class Dinophyceae			
Family Ceratiaceae			
<i>Ceratium</i> spp. ^c	CELL	5	0
Family Peridiniaceae			
<i>Peridinium</i> spp. ^c	CELL	36	30
TOTAL ABUNDANCE ^c	² Natural Units/mL	13,224	25,385
ORGANISMS COUNTED ^c	NUMBER	33	33
SAMPLE VOLUME COLLECTION ^f	mL	208	186
SAMPLE VOLUME FILTERED THROUGH PLANKTON NET ^c	LITER	40	40
SAMPLE CONDITION (VISUAL OBSERVATION) COLOUR AND TURBIDITY OF WATER COLOUR OF SEDIMENT		YELLOW/TURBID BROWN	GREEN/TURBID GREEN

^b : ISO/IEC 17025 ACCREDITED BY DEPARTMENT OF SCIENCE SERVICE (DSS)

^c : VERIFIED BY OWN LABORATORY QUALITY SYSTEM, BUT NOT IN SCOPE OF ACCREDITATION

REMARK : 1. STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 24th EDITION, 2023
PART 10200 F.

2. REPORTING COUNTS (Natural Units/mL) BASED ON SUBSAMPLING 1 mL FILTERED WATER SAMPLE WHICH FIELD COLLECTED
FROM A PLANKTON NET TOWING.

SAMPLE NAME SAMPLE NO. 1 วัดวังบัวทอง (เหนือจุดปล่อยน้ำ)

SAMPLE NO. 2 วัดห้วยลำ (ใต้จุดปล่อยน้ำ)

Chaweevan B.

(MISS CHAWEEWAN BOONLA)
LABORATORY SUPERVISOR

ANALYSIS REPORT

CUSTOMER NAME : DOUBLE A (1991) PUBLIC CO.,LTD (PULP 1)
ADDRESS : 1 MOO 2 THA TUM SI MAHA PHOT PRACHIN BURI 25140
CONTACT INFORMATION : TEL : 08 5835 1371 e-mail : kunnapat_p@doublea1991.com
SAMPLING SOURCE : -
SAMPLE TYPE : SURFACE WATER **RECEIVED DATE** : MARCH 4, 2025
SAMPLING DATE : MARCH 3, 2025 **ANALYTICAL DATE** : MARCH 4-14, 2025
SAMPLING TIME : * **ISSUE DATE** : MARCH 18, 2025
SAMPLING METHOD : PLANKTON NET **REPORT NO.** : 2025-U022261
SAMPLING BY : MR KRIDSANAPONG NAMTHIP **WORK NO.** : 2024-009408
ANALYZED BY : MISS NAPAPORN PURATAKO **ANALYSIS NO.** : T25AE493-0002, T25AE493-0005

ZOOPLANKTON (UNITS/m) ³	COUNTING UNIT	RESULT	
		SAMPLE NO. 1 11:10 HOUR * T25AE493-0002	SAMPLE NO. 2 13:15 HOUR * T25AE493-0005
Phylum Protozoa			
Class Sarcodina			
Family Arcellidae			
<i>Arcella</i> sp.	INDIVIDUAL	3,789	72,337
Family Diffugiidae			
<i>Diffugia</i> sp.	INDIVIDUAL	1,750	875
Phylum Rotifera			
Class Monogononta			
Family Brachionidae			
<i>Brachionus</i> sp.	INDIVIDUAL	2,625	17,500
<i>Keratella</i> sp.	INDIVIDUAL	0	8,164
Family Lecanidae			
<i>Lecane</i> sp.	INDIVIDUAL	0	875
Family Trichocercidae			
<i>Trichocerca</i> sp.	INDIVIDUAL	1,750	0
Family Hexarthridae			
<i>Hexarthra</i> sp.	INDIVIDUAL	1,462	0
Family Synchaetidae			
<i>Synchaeta</i> sp.	INDIVIDUAL	5,250	0
<i>Polyarthra</i> sp.	INDIVIDUAL	0	587
Family Asplanchnidae			
<i>Asplanchna</i> sp.	INDIVIDUAL	3,212	0
Phylum Arthropoda			
Class Crustacea			
Cyclopoid Copepod	INDIVIDUAL	0	1,164
Nauplius of Copepod	INDIVIDUAL	4,664	2,914
Family Bosminidae			
<i>Bosmina</i> sp.	INDIVIDUAL	0	587



ZOOPLANKTON (UNITS/m ³)	COUNTING UNIT	RESULT	
		SAMPLE NO. 1 11:10 HOUR * T25AE493-0002	SAMPLE NO. 2 13:15 HOUR * T25AE493-0005
Phylum Mollusca			
Class Bivalvia			
Bivalvia Larva	INDIVIDUAL	11,664	3,500
TOTAL ABUNDANCE	UNITS/m ³	36,166	108,503
ORGANISMS COUNTED	NUMBER	9	10
SAMPLE CONDITION (VISUAL OBSERVATION)			
COLOUR AND TURBIDITY OF WATER		YELLOW/TURBID	GREEN/TURBID
COLOUR OF SEDIMENT		BROWN	GREEN

REMARK : 1. STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 24th EDITION, 2023
PART 10200 G.

SAMPLE NAME SAMPLE NO. 1 วัดรังบัวทอง (เหนือจุดปล่อยน้ำ)

SAMPLE NO. 2 วัดหลังถ้ำ (ใต้จุดปล่อยน้ำ)



(MISS CHAWEEVAN BOONLA)
LABORATORY SUPERVISOR

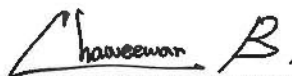
ANALYSIS REPORT

CUSTOMER NAME : DOUBLE A (1991) PUBLIC CO.,LTD (PULP 1)
ADDRESS : 1 MOO 2 THA TUM SI MAHA PHOT PRACHIN BURI 25140
CONTACT INFORMATION : TEL : 08 5835 1371 e-mail : kunnapat_p@doublea1991.com
SAMPLING SOURCE : -
SAMPLE TYPE : SEDIMENT **RECEIVED DATE** : MARCH 4, 2025
SAMPLING DATE : MARCH 3, 2025 **ANALYTICAL DATE** : MARCH 4-13, 2025
SAMPLING TIME : * **ISSUE DATE** : MARCH 18, 2025
SAMPLING METHOD : PETERSEN GRAB **REPORT NO.** : 2025-U022263
SAMPLING BY : MR KRIDSANAPONG NAMTHIP **WORK NO.** : 2024-009408
ANALYZED BY : MISS KRISSANA KOMOLWANICH **ANALYSIS NO.** : T25AE493-0003, T25AE493-0006

BENTHOS (INDIVIDUALS/m ²)	RESULT	
	SAMPLE NO. 1 11:20 HOUR * T25AE493-0003	SAMPLE NO. 2 13:30 HOUR * T25AE493-0006
Phylum Annelida		
Class Oligochaeta		
Family Tubificidae	7	7
Phylum Arthropoda		
Class Insecta		
Family Ephemeridae	7	0
Family Elmidae	0	7
TOTAL DENSITY (INDIVIDUALS/m²)	14	14
AMOUNT OF SPECIES	2	2
SAMPLE CONDITION	LEAF WRECK	LEAF WRECK

SAMPLE NO. 1 วัดวังบัวทอง (เหนือจุดปล่อยน้ำ)

SAMPLE NO. 2 วัดหลังท่า (ใต้จุดปล่อยน้ำ)



(MISS CHAWEEWAN BOONLA)
LABORATORY SUPERVISOR



คุณภาพอากาศในพื้นที่ทำงาน

ตรวจวัดโดยบริษัท อินทิเกรทเต็ด รีเสิร์ช เซ็นเตอร์ จำกัด



Analysis Report (TD+RD)

Job No. : AAH250210113

Issued Date : 22 March 2025

REPORT No. WD011/2025
CUSTOMER NAME บริษัท ดับเบิล เอ (1991) จำกัด (มหาชน) (โรงเยื่อ 1)
CONTACT NAME คุณกัญญ์ณภัท ปัญญาประเสริฐ (085-835-1371)
SAMPLING PARAMETER Total Dust and Respirable Dust
SAMPLING DATE 13 March 2025
ANALYTICAL DATE 21 March 2025
SAMPLING INSTRUMENT Personal Air Sampling Model SKC 224-PCXR8 and PVC Filter

Item	Location	Measured Time	Result (mg/m ³)	
			Total Dust	Respirable Dust
1	Wood Handling at Chipper	9.55 am - 10.55 am	0.11	0.01
2	Wood Handling at Debarking Drum	9.55 am - 10.55 am	0.25	0.05
3	RC & LK	11.10 am - 12.10 pm	0.37	0.14
4	Used Oil Plant	3.40 pm - 4.40 pm	0.27	-
Standard*			15	5

Reference : *Notification of Ministry of Interior on Safety in Working Environment, B.E. 2520 (Chemical Substances)

Tested by : ไกรวิชญ์
Mr. Kaiwit Sangkaew
Environmental Scientist

Approved by : ทิพย์
Ms.Thittaya Nanmuen
Laboratory Manager

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Analysis Report (TD+RD)

Job No. : AAH250210113

Issued Date : 28 June 2025

REPORT No. WD030/2025
CUSTOMER NAME บริษัท ดับเบิล เอ (1991) จำกัด (มหาชน) (โรงเยื่อ 1)
CONTACT NAME คุณกัญญ์จรรย์นภัส ปัญญาประเสริฐ (085-835-1371)
SAMPLING PARAMETER Total Dust and Respirable Dust
SAMPLING DATE 16 - 17 June 2025
ANALYTICAL DATE 26 June 2025
SAMPLING INSTRUMENT Personal Air Sampling Model SKC 224-PCXR8 and PVC Filter

Item	Location	Measured Time	Result (mg/m ³)	
			Total Dust	Respirable Dust
1	Wood Handling at Chipper	10.05 am - 11.05 am	0.12	0.04
2	Wood Handling at Debarking Drum	10.05 am - 11.05 am	0.07	0.03
3	RC & LK	3.05 pm - 4.05 pm	0.51	0.09
4	ระบบฝังกลบแบบ Secured Landfill	2.20 pm - 3.20 pm	0.15	0.03
Standard*			15	5

Reference : *Notification of Ministry of Interior on Safety in Working Environment, B.E. 2520 (Chemical Substances)

Tested by :

Mr. Kaiwit Sangkaew
Environmental Scientist

Approved by :

Ms. Thittaya Nanmuen
Laboratory Manager

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ระดับเสียงในพื้นที่ทำงาน

ตรวจวัดโดยบริษัท อินทิเกรทเต็ด รีเสิร์ช เซ็นเตอร์ จำกัด



Analysis Report (Leq 8)

Job No. : AAH250210113

Issued Date : 27 March 2025

REPORT No. WS002/2025
CUSTOMER NAME บริษัท ดีบีบี เอ (1991) จำกัด (มหาชน) (โรงเยื่อ 1)
CONTACT NAME คุณกัญญ์ณภัส ปัญญาประเสริฐ (085-835-1371)
MEASURED PARAMETER Equivalent Sound Level 8 hours (Leq 8 hrs)
MEASURED DATE 13 March 2025
MEASURED TIME 9.55 am - 5.55 pm
MEASURED INSTRUMENT Sound Level Meter Model Aco Type 6236 No.13 Serial No.192016

Location	Period	Sound Level [dB(A)]	
		Leq	Lmax
Debarking Drum Line 1	1 st hour	76.2	81.1
	2 nd hour	78.1	83.3
	3 rd hour	77.9	88.9
	4 th hour	76.6	82.1
	5 th hour	77.7	83.4
	6 th hour	78.4	84.4
	7 th hour	77.8	82.6
	8 th hour	78.1	83.7
	Leq 8 hrs	77	
	Standard ^{1/}	85	

Reference : ^{1/} Announcement of Department of Labour Protection and Welfare, B.E.2561 (Time Weighted Average-TWA)

Tested by : ไกรวิทย์
Mr. Kaiwit Sangkaew
Environmental Scientist

Approved by : ทิชญา
Ms. Thittaya Nanmuen
Laboratory Manager

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Analysis Report (Leq 8)

Job No. : AAH250210113

Issued Date : 27 March 2025

REPORT No. WS002/2025
CUSTOMER NAME บริษัท ดีบีเอส เอ (1991) จำกัด (มหาชน) (โรงเยื่อ 1)
CONTACT NAME คุณกัญญ์ณภัส ปัญญาประเสริฐ (085-835-1371)
MEASURED PARAMETER Equivalent Sound Level 8 hours (Leq 8 hrs)
MEASURED DATE 13 March 2025
MEASURED TIME 9.55 am - 5.55 pm
MEASURED INSTRUMENT Sound Level Meter Model Aco Type 6236 No.14 Serial No.212014

Location	Period	Sound Level [dB(A)]	
		Leq	Lmax
Chipper Line 1	1 st hour	83.2	88.6
	2 nd hour	82.5	86.1
	3 rd hour	83.2	85.4
	4 th hour	84.1	90.0
	5 th hour	83.7	89.7
	6 th hour	82.9	87.4
	7 th hour	82.9	85.8
	8 th hour	83.7	87.7
	Leq 8 hrs	83	
	Standard ^{1/}	85	

Reference : ^{1/} Announcement of Department of Labour Protection and Welfare, B.E.2561 (Time Weighted Average-TWA)

Tested by : ไกรวิทย์
Mr. Kaiwit Sangkaew
Environmental Scientist

Approved by : ทิม
Ms. Thittaya Nanmuen
Laboratory Manager

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Analysis Report (Leq 12 hr.)

Job No. : AAH250210113

Issued Date : 27 March 2025

REPORT No. S2_002/2025
CUSTOMER NAME บริษัท ดับเบิล เอ (1991) จำกัด (มหาชน) (โรงเยื่อ 1)
CONTACT NAME คุณกัญญ์ณภัส ปัญญาประเสริฐ (085-835-1371)
MEASURED PARAMETER Equivalent Sound Level 12 hours (Leq 12 hrs)
MEASURED DATE 13 March 2025
MEASURED TIME 9.55 am - 9.55 pm
MEASURED INSTRUMENT Sound Level Meter Model Aco Type 6236 No.13 Serial No.192016

Location	Period	Sound Level [dB(A)]	
		Leq	Lmax
Debarking Drum Line 1	1 st hour	76.2	81.1
	2 nd hour	78.1	83.3
	3 rd hour	77.9	88.9
	4 th hour	76.6	82.1
	5 th hour	77.7	83.4
	6 th hour	78.4	84.4
	7 th hour	77.8	82.6
	8 th hour	78.1	83.7
	9 th hour	77.4	83.6
	10 th hour	77.9	82.4
	11 th hour	78.2	84.3
	12 th hour	77.1	83.6
	Leq 12 hrs	77	
	Standard ^{1/}	83	

Reference : ^{1/}Announcement of Department of Labour Protection and Welfare, B.E.2561 (Time Weighted Average-TWA)

Tested by : ไกรวิทย์
Mr. Kaiwit Sangkaew
Environmental Scientist

Approved by : ทิม
Ms. Thittaya Nanmuen
Laboratory Manager

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Analysis Report (Leq 12 hr.)

Job No. : AAH250210113


Issued Date : 27 March 2025

REPORT No. S2_002/2025
CUSTOMER NAME บริษัท ดับเบิล เอ (1991) จำกัด (มหาชน) (โรงเยื่อ 1)
CONTACT NAME คุณกัญญ์ณภัท ปัญญาประเสริฐ (085-835-1371)
MEASURED PARAMETER Equivalent Sound Level 12 hours (Leq 12 hrs)
MEASURED DATE 13 March 2025
MEASURED TIME 9.55 am - 9.55 pm
MEASURED INSTRUMENT Sound Level Meter Model Aco Type 6236 No.14 Serial No.212014

Location	Period	Sound Level [dB(A)]	
		Leq	Lmax
Chipper Line 1	1 st hour	83.2	88.6
	2 nd hour	82.5	86.1
	3 rd hour	83.2	85.4
	4 th hour	84.1	90.0
	5 th hour	83.7	89.7
	6 th hour	82.9	87.4
	7 th hour	82.9	85.8
	8 th hour	83.7	87.7
	9 th hour	83.9	89.9
	10 th hour	83.3	88.5
	11 th hour	82.9	86.6
	12 th hour	83.3	86.7
	Leq 12 hrs	83	
	Standard ^{1/}	83	

Reference : ^{1/}Announcement of Department of Labour Protection and Welfare, B.E.2561 (Time Weighted Average-TWA)

Tested by : 
Mr. Kaiwit Sangkaew
Environmental Scientist

Approved by : 
Ms. Thittaya Nanmuen
Laboratory Manager

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Analysis Report (Leq 8)

Job No. : AAH250210113


Issued Date : 30 June 2025

REPORT No. WS009/2025
CUSTOMER NAME บริษัท ดีบีเอส เอ (1991) จำกัด (มหาชน) (โรงเยื่อ 1)
CONTACT NAME คุณกัญญ์ณภัท ปัญญาประเสริฐ (085-835-1371)
MEASURED PARAMETER Equivalent Sound Level 8 hours (Leq 8 hrs)
MEASURED DATE 17 June 2025
MEASURED TIME 10.20 am - 6.20 pm
MEASURED INSTRUMENT Sound Level Meter Model Aco Type 6236 No.12 Serial No.192015

Location	Period	Sound Level [dB(A)]	
		Leq	Lmax
Debarking Drum Line 1	1 st hour	80.6	94.4
	2 nd hour	80.9	92.5
	3 rd hour	81.2	92.5
	4 th hour	77.5	87.4
	5 th hour	79.5	85.5
	6 th hour	76.8	83.7
	7 th hour	79.8	87.4
	8 th hour	79.2	92.8
	Leq 8 hrs	79	
	Standard ^{1/}	85	

Reference : ^{1/} Announcement of Department of Labour Protection and Welfare, B.E.2561 (Time Weighted Average-TWA)

Tested by : 
Mr. Kaiwit Sangkaew
Environmental Scientist

Approved by : 
Ms. Thittaya Nanmuen
Laboratory Manager

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Analysis Report (Leq 12 hr.)

Job No. : AAH250210113

Issued Date : 27 March 2025

REPORT No. S2_008/2025
CUSTOMER NAME บริษัท ดับเบิล เอ (1991) จำกัด (มหาชน) (โรงเยื่อ 1)
CONTACT NAME คุณกัญญณภัส ปัญญาประเสริฐ (085-835-1371)
MEASURED PARAMETER Equivalent Sound Level 12 hours (Leq 12 hrs)
MEASURED DATE 17 June 2025
MEASURED TIME 10.20 am - 10.20 pm
MEASURED INSTRUMENT Sound Level Meter Model Aco Type 6236 No.12 Serial No.192015

Location	Period	Sound Level [dB(A)]	
		Leq	Lmax
Debarking Drum Line 1	1 st hour	80.6	94.4
	2 nd hour	80.9	92.5
	3 rd hour	81.2	92.5
	4 th hour	77.5	87.4
	5 th hour	79.5	85.5
	6 th hour	76.8	83.7
	7 th hour	79.8	87.4
	8 th hour	79.2	92.8
	9 th hour	80.1	91.3
	10 th hour	79.1	85.8
	11 th hour	79.4	88.2
	12 th hour	79.5	89.2
	Leq 12 hrs	79	
	Standard ^{1/}	83	

Reference : ^{1/} Announcement of Department of Labour Protection and Welfare, B.E.2561 (Time Weighted Average-TWA)

Tested by : ไกรวิทย์
Mr. Kaiwit Sangkaew
Environmental Scientist

Approved by : กัทธ
Ms. Thittaya Nanmuen
Laboratory Manager

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Analysis Report (Leq 8)

Job No. : AAH250210113


Issued Date : 30 June 2025

REPORT No. WS009/2025
CUSTOMER NAME บริษัท ดีบีเอส เอ (1991) จำกัด (มหาชน) (โรงเยื่อ 1)
CONTACT NAME คุณกัญญ์ณภัฏ ปัญญาประเสริฐ (085-835-1371)
MEASURED PARAMETER Equivalent Sound Level 8 hours (Leq 8 hrs)
MEASURED DATE 17 June 2025
MEASURED TIME 10.15 am - 6.15 pm
MEASURED INSTRUMENT Sound Level Meter Model Aco Type 6236 No.14 Serial No.212014

Location	Period	Sound Level [dB(A)]	
		Leq	Lmax
Chipper Line 1	1 st hour	83.1	85.9
	2 nd hour	83.2	85.7
	3 rd hour	83.5	87.4
	4 th hour	82.4	85.7
	5 th hour	82.3	95.6
	6 th hour	81.3	86.0
	7 th hour	82.8	86.3
	8 th hour	82.3	85.3
	Leq 8 hrs	82	
	Standard ^{1/}	85	

Reference : ^{1/} Announcement of Department of Labour Protection and Welfare, B.E.2561 (Time Weighted Average-TWA)

Tested by : 
Mr. Kaiwit Sangkaew
Environmental Scientist

Approved by : 
Ms. Thittaya Nanmuen
Laboratory Manager

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Analysis Report (Leq 12 hr.)

Job No. : AAH250210113

Issued Date : 27 March 2025

REPORT No. S2_008/2025
CUSTOMER NAME บริษัท ดีบีเอส เอ (1991) จำกัด (มหาชน) (โรงเยื่อ 1)
CONTACT NAME คุณกัญญณัฐภัส ปัญญาประเสริฐ (085-835-1371)
MEASURED PARAMETER Equivalent Sound Level 12 hours (Leq 12 hrs)
MEASURED DATE 17 June 2025
MEASURED TIME 10.15 am - 10.15 pm
MEASURED INSTRUMENT Sound Level Meter Model Aco Type 6236 No.14 Serial No.212014

Location	Period	Sound Level [dB(A)]	
		Leq	Lmax
Chipper Line 1	1 st hour	83.1	85.9
	2 nd hour	83.2	85.7
	3 rd hour	83.5	87.4
	4 th hour	82.4	85.7
	5 th hour	82.3	95.6
	6 th hour	81.3	86.0
	7 th hour	82.8	86.3
	8 th hour	82.3	85.3
	9 th hour	82.7	87.2
	10 th hour	82.7	89.4
	11 th hour	82.9	88.1
	12 th hour	82.7	87.5
	Leq 12 hrs	82	
	Standard ^{1/}	83	

Reference : ^{1/} Announcement of Department of Labour Protection and Welfare, B.E.2561 (Time Weighted Average-TWA)

Tested by : ไกรวิทย์
Mr. Kaiwit Sangkaew
Environmental Scientist

Approved by : ทิตตยา
Ms. Thittaya Nanmuen
Laboratory Manager

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ระดับความร้อนในพื้นที่ทำงาน

ตรวจวัดโดยบริษัท อินทิเกรทเต็ด รีเสิร์ช เซ็นเตอร์ จำกัด



Analysis Report (Heat)

Job No. : AAH250210113

Issued Date : 27 March 2025

REPORT No. WH001/2025
CUSTOMER NAME บริษัท ดีบีเอส เอ (1991) จำกัด (มหาชน) (โรงเยื่อ 1)
CONTACT NAME คุณกัญญ์ณภัฏ ปัญญาประเสริฐ (085-835-1371)
MEASURED PARAMETER Wet Bulb Globe Temperature
MEASURED DATE 13, 25 March 2025
MEASURED TIME 9.30 am - 11.30 am
MEASURED INSTRUMENT Heat Stress Monitor Model Delta Ohm ; HD 32.2

Item	Location	Type of Work	Temperature (°C)				
			WB	GT	DB	WBGT	Standard ^{1/}
1	Digester Pulp 1	งานเบา	26.4	36.5	35.9	30	34
2	Recaustic & Lime kiln	งานเบา	25.8	35.6	35.2	29	34
3	Recovery Boiler at Burner Floor at NPP5	งานเบา	28.1	39.0	38.6	31	34

Reference : ^{1/} Ministerial Regulation on Standard of Safety Administration and Management, Occupational Health and Environmental Condition concerning Heat, Light and Noise, B.E. 2559 (Section 1 : Heat)

Tested by : ไกรวัชร
Mr. Kaiwit Sangkaew
Environmental Scientist

Approved by : กัญญา
Ms.Thittaya Nanmuen
Laboratory Manager

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Analysis Report (Heat)

Job No. : AAH250210113

Issued Date : 30 June 2025

REPORT No. WH006/2025
CUSTOMER NAME บริษัท ดีบีบี เอ (1991) จำกัด (มหาชน) (โรงเยื่อ 1)
CONTACT NAME คุณกัญญ์ณภัส ปัญญาประเสริฐ (085-835-1371)
MEASURED PARAMETER Wet Bulb Globe Temperature
MEASURED DATE 17, 28 June 2025
MEASURED TIME 9.30 am - 11.30 am
MEASURED INSTRUMENT Heat Stress Monitor Model Delta Ohm ; HD 32.2

Item	Location	Type of Work	Temperature (°C)				
			WB	GT	DB	WBGT	Standard ^{1/}
1	Digester Pulp 1	งานเบา	27.1	37.1	34.1	30	34
2	Recaustic & Lime kiln	งานเบา	27.3	36.0	35.6	30	34
3	Recovery Boiler at Burner Floor at NPP5	งานเบา	31.1	37.5	36.8	33	34

Reference : ^{1/} Ministerial Regulation on Standard of Safety Administration and Management, Occupational Health and Environmental Condition concerning Heat, Light and Noise, B.E. 2559 (Section 1 : Heat)

Tested by : ไกรวิทย์
Mr. Kaiwit Sangkaew
Environmental Scientist

Approved by : ทิพย์
Ms.Thittaya Nanmuen
Laboratory Manager

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สารเคมีในพื้นที่ทำงาน

ตรวจวัดโดยบริษัท อินทิเกรทเต็ด รีเสิร์ช เซ็นเตอร์ จำกัด



Analysis Report (Chemical)

Job No. : AAH250210113

Issued Date : 5 April 2025

REPORT No. WC004/2025
CUSTOMER NAME บริษัท ดับเบิล เอ (1991) จำกัด (มหาชน) (โรงเยื่อ 1)
CONTACT NAME คุณกัญญณัฐ ปัญญาประเสริฐ (085-835-1371)
SAMPLING PARAMETER Chemical Fume
SAMPLING DATE 13 March 2025
ANALYTICAL DATE 18 March - 5 April 2025
SAMPLING INSTRUMENT Personal Air Sampling Model SKC 224-PCXR8 and Sorbent Tube/MCE Filter/Solution/Impinger/Bag

Item	Location	Parameter ^{3/}	Unit	Result	Standard ^{1/}	LOD	Analytical Method
1	Chemical Plant	NaOH	mg/m ³	0.02	2	0.001	OSHA ID 121
		ClO ₂	mg/m ³	0.10	0.3	0.001	OSHA ID 101
		SO ₂ ^{4/}	ppm	0.008	5	0.001	UV Fluorescence
2	ClO ₂ Plant	NaOH	mg/m ³	0.04	2	0.001	OSHA ID 121
		ClO ₂	mg/m ³	0.01	0.3	0.001	OSHA ID 101
		SO ₂ ^{4/}	ppm	0.008	5	0.001	UV Fluorescence
3	Fiberline	H ₂ S ^{4/}	ppm	0.028	20	0.001	UV Fluorescence
		CH ₃ SH	ppm	0.02	10	0.01	NIOSH 2542
		CH ₃ SCH ₃	ppm	0.06	10 ^{2/}	0.01	OSHA IMIS D650

Reference : ^{1/} Announcement of Department of Labour Protection and Welfare, B.E. 2560 (Chemical Threshold Limit)

^{2/} American Conference of Governmental Industrial Hygienists 2013 (ACGIH)

^{3/} Tested by Emex Association Co., Ltd. Registration No. 7-244.

^{4/} Tested by Integrated Research Center Co., Ltd. Registration No. 7-199.

Sampling by : ไกววิท
Mr. Kaiwit Sangkaew
Environmental Scientist

Approved by : กัทธ
Ms.Thittaya Nanmuen
Laboratory Manager

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Page 1 of 3



Analysis Report (Chemical)

Job No. : AAH250210113

Issued Date : 25 April 2025

REPORT No. WC004/2025
CUSTOMER NAME บริษัท ดีบีบี เอ (1991) จำกัด (มหาชน) (โรงเยื่อ 1)
CONTACT NAME คุณกัญญ์ณภัท ปิณฑาประเสริฐ (085-835-1371)
SAMPLING PARAMETER Chemical Fume
SAMPLING DATE 25 March 2025
ANALYTICAL DATE 3 - 24 April 2025
SAMPLING INSTRUMENT Personal Air Sampling Model SKC 224-PCXR8 and Sorbent Tube , Sampling Bag

Item	Location	Parameter ^{3/}	Unit	Result	Standard ^{1/}	LOD	Analytical Method
1	Pulp Mill at Evaporation Plant	H ₂ S ^{4/}	ppm	0.057	20	0.001	UV Fluorescence
		CH ₃ SH	ppm	0.03	10	0.025	NIOSH 2542
		CH ₃ SCH ₃	ppm	0.15	10 ^{2/}	0.01	OSHA IMIS D650
2	Recovery Boiler at Burner Floor	H ₂ S ^{4/}	ppm	0.032	20	0.001	UV Fluorescence
		CH ₃ SH	ppm	0.08	10	0.025	NIOSH 2542
		CH ₃ SCH ₃	ppm	0.15	10 ^{2/}	0.01	OSHA IMIS D650

Reference : ^{1/} Announcement of Department of Labour Protection and Welfare, B.E. 2560 (Chemical Threshold Limit)

^{2/} American Conference of Governmental Industrial Hygienists 2013 (ACGIH)

^{3/} Tested by Emex Association Co., Ltd. Registration No. ๖-244.

^{4/} Tested by Integrated Research Center Co.,Ltd. Registration No. ๖-199.

Sampling by : ไกรวิทย์
Mr. Kaiwit Sangkaew
Environmental Scientist

Approved by : ทศพร
Ms.Thittaya Nanmuen
Laboratory Manager

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• REPORTED ANALYSIS REFERS TO SUBMITTED SAMPLE ONLY

Page 3 of 3

Analysis Report (Chemical)

Job No. : AAH250210113

Issued Date : 9 July 2025

REPORT No. WC023/2025

CUSTOMER NAME บริษัท ดับเบิล เอ (1991) จำกัด (มหาชน) (โรงเยื่อ 1)

CONTACT NAME คุณกัญญ์ณภัท บัญญาประเสริฐ (085-835-1371)

SAMPLING PARAMETER Chemical Fume

SAMPLING DATE 17 - 18 June 2025

ANALYTICAL DATE 20 June - 8 July 2025

SAMPLING INSTRUMENT Personal Air Sampling Model SKC 224-PCXR8 and Sorbent Tube/MCE Filter/Solution/Impinger/Bag

Item	Location	Parameter ^{3/}	Unit	Result	Standard ^{1/}	LOD	Analytical Method
1	Chemical Plant	NaOH	mg/m ³	0.03	2	0.001	OSHA ID 121
		ClO ₂	mg/m ³	0.01	0.3	0.001	OSHA ID 101
		SO ₂ ^{4/}	ppm	0.007	5	0.001	UV Fluorescence
2	ClO ₂ Plant	NaOH	mg/m ³	0.03	2	0.001	OSHA ID 121
		ClO ₂	mg/m ³	0.01	0.3	0.001	OSHA ID 101
		SO ₂ ^{4/}	ppm	0.009	5	0.001	UV Fluorescence
3	Fiberline	H ₂ S ^{4/}	ppm	2.256	20	0.001	UV Fluorescence
		CH ₃ SH	ppm	0.10	10	0.01	NIOSH 2542
		CH ₃ SCH ₃	ppm	0.08	10 ^{2/}	0.01	OSHA IMIS D650

Reference : ^{1/} Announcement of Department of Labour Protection and Welfare, B.E. 2560 (Chemical Threshold Limit)

^{2/} American Conference of Governmental Industrial Hygienists 2013 (ACGIH)

^{3/} Tested by Emex Association Co., Ltd. Registration No. ๖-244.

^{4/} Tested by Integrated Research Center Co.,Ltd. Registration No. ๖-199.

Sampling by : ไกรวิทย์

Mr. Kaiwit Sangkaew
Environmental Scientist

Approved by : ทิพย์

Ms.Thittaya Nanmuen
Laboratory Manager

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Page 1 of 2

ภาคผนวก จ
ใบรับรองการสอบเทียบเครื่องมือ

บริษัท อินทิเกรทเต็ด รีเสิร์ช เซ็นเตอร์ จำกัด



Certificate of Calibration

Equipment: Balance
Model: BSA224S-CW
Serial No. (or ID.): 34490341
Manufacturer: Sartorius
Condition: In condition

Certificate No.: C01243398
Issued Date: 06 November 2024
Job No.: WO-00047130
Page: 1 of 2

Customer: Integrated Research Center Co., Ltd.
122 Moo 2, Tambol Thatoom,
Amphur Srimahaphote, Prachinburi 25140 Thailand

Environment Condition: Temperature 24 °C ± 0.4 °C
Humidity 60 %RH ± 3.3 %RH

Calibration Place: Double A (1991) Public Company Limited.
(Water Laboratory IP1 (Balance Room))
1 Moo 2, Thatoom, Srimahaphot,
Prachinburi 25140 Thailand.

Calibration By: Mr. Piypat Saidoung

Calibration Date: 30 October 2024

The Method used: In-house method, CAL-WI-47, based on UKAS Lab 14

Traceability: This certificate is traceable to the SI Units maintained by National Institute of Metrology (NIMT), Thailand through DKSH Technology Co., Ltd. Certificate No. C02231944

Calibration Results:

Without Adjustment

Eccentric Error: Weight to be 1/3 or 1/2 of Maximum capacity, taken from the center of the pan as a zero reference.

Nominal Test Value		100 (g)				
		Reference Points (g)				
A	B	C	D	E		
-	0.0001	0.0001	-0.0001	-0.0001		

Repeatability: Determination of the standard deviation of weighing balance., Readability 0.0001 (g)

Nominal test value (g)	Standard Deviation
20	0.00004
200	0.00006

Error of indication from nominal or conventional mass value., Readability 0.0001 (g)

Nominal Value (g)	Conventional Mass (g)	Displayed Value (g)	Error of Indication (g)	Uncertainty (g)	k
0.1	0.10001	0.1000	0.0000	0.00011	2.04
0.2	0.20001	0.2000	0.0000	0.00011	2.04
0.5	0.50001	0.5000	0.0000	0.00011	2.04
1	1.00001	1.0000	0.0000	0.00011	2.04
2	2.00002	2.0000	0.0000	0.00011	2.04
5	5.00002	5.0000	0.0000	0.00011	2.04
10	10.00001	10.0000	0.0000	0.00011	2.04
20	20.00001	20.0000	0.0000	0.00012	2.03
50	50.00001	50.0000	0.0000	0.00013	2.02
100	100.00003	100.0000	0.0000	0.00017	2.01
200	200.00000	200.0000	0.0000	0.00030	2.00

The End of Certificate

This certificate is issued the units of measurement according to the International System of Units (SI). It provides traceability of measurement to international or national standard or other recognized national standard laboratories.
The measurement uncertainty stated is the expanded uncertainty which is obtained from the standard uncertainty multiplied by the coverage factor (k=2) to provide a level of confidence of approximately 95%. It is determined in accordance with the Guide to Expression of Uncertainty in Measurement (GUM).
These results may be affected by deviations from specified conditions. The results relate only to the items tested, calibrated or sampled. The report shall not be reproduced except in full without approval of DKSH Technology Limited.

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DKSH Technology Limited
2533 ถนนสุขุมวิท แขวงคลองเตย เขตคลองเตย กรุงเทพมหานคร 10260
2533 Sukhumvit Road, Bangkok, Prachinburi, Bangkok 10260
Phone: +66 2033 7100 Email: info.calibration@dksh.com Website: www.dksh.com/scientific-thailand

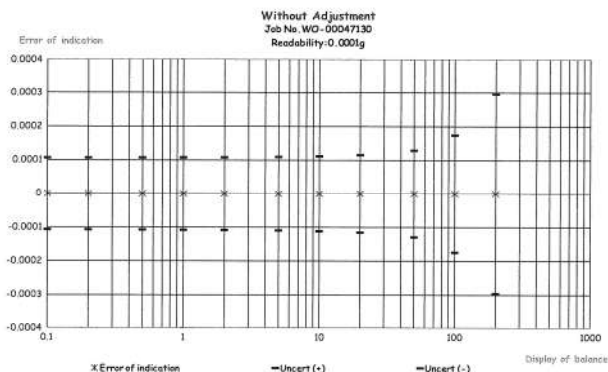
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CAL-FM-C01-14: 12 Sep 2022

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ใบตรวจสอบสภาพเครื่องชั่ง

เลขที่ใบงาน: WO-00047130

ชนิดเครื่องมือ: Balance

รุ่น: BSA224S-CW

หมายเลขเครื่อง: 34490341

ตรวจสอบ (รับ)		รายการตรวจเช็ค	ตรวจสอบ (ส่ง)		หมายเหตุ
30 Oct 2024			30 Oct 2024		
ปกติ	ไม่ปกติ		ปกติ	ไม่ปกติ	
		General			
<input checked="" type="checkbox"/>	<input type="checkbox"/>	1. สายไฟ/Adapter, power supply 220/110V	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	2. ความสมบูรณ์ชุดกระดกกันลม (Cover)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	3. ความสมบูรณ์ชุดของระดับน้ำ	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	4. การปรับระดับของขาตั้งเครื่อง	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	5. การทดสอบสั่นของน้ำหนัก	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	6. ความสมบูรณ์ของ Display	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	7. การแสดงผลของ Display หลังวางน้ำหนัก	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	8. ชุดรองจานชั่ง (Stopper) / pan support	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	9. การทำงานของ Function Internal / External	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	10. ความสะอาดของตัวเครื่องภายนอกและแผ่น load cell	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	11. สภาวะแวดล้อม ณ สถานที่ตั้งเครื่อง	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

หมายเหตุเพิ่มเติมอื่น ๆ :

Mr. Piypat Saidoung

Service Engineer

บริษัท ดีเคเอส อีเซีย จำกัด
DKSH Technology Limited
2533 ถนนสุขุมวิท แขวงคลองเตย เขตคลองเตย กรุงเทพมหานคร 10260
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CALIBRATION CERTIFICATE

Nomenclature : PERSONAL AIR PUMP SAMPLING PUMP CALIBRATION

Manufacturer : MesaLabs

Serial No. : 210155

Model : Defender 510

Scale range : 50 ml/min to 5000 ml/min

Subdivision : (0.00001, 0.0001) l/min

Submitted by : INTEGRATED RESEARCH CENTER COMPANY LIMITED.

122 T.Thatoom A.Srimahaphote,

Prachinburi 25140, Thailand.

Received date : 15 January 2025

Condition of measured item : Normal

Calibration date : 3 February 2025

Standard :

Standard	Certificate No.	Date due	Traceability
RTD Thermometer	PSL-T 0811/67	3-Jul-26	TISTR
Molbox/Pressure Transducer/UpStream	MP-0076-23	2-Apr-25	NIMT
Primary Flow Calibrator S/N 119521	MW-0033-23	6-Jun-25	NIMT

Calibrated by : Terasak Panna

(Mr.Terasak Panna)

Approved by :

(Ms.Krana Luanghirun)

Director

Mechanical Engineering Standards Laboratory

Ref. 2013268011500202001

Issued Date 5 February 2025

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Bangkok 10900, Thailand
Tel. (66) 0 2579 1121-30 ext. 5219, 5225, 5217
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J NAC
JIRANATEE ASSOCIATES CO., LTD.
Jiranatee Associates Co., Ltd.
6374-15, 6739-16
Petchkasem 7/71, Rd. Wattana, Bangkok,
Bangkok 10000 (Thailand)
Tel. +66(0)860812
Mobile +66(0)8395413
E-mail : jnirac@jiranatee.com
Web site : www.jiranatee.com

Accredited calibration laboratory
ISO/IEC 17025:2017
ACC-770-TIS 17025
CALIBRATION 0367
Flow measurement laboratory
Calibration services department.



CERTIFICATE OF CALIBRATION

Certificate No. : COF-013-67

Page 1 of 2 Pages

MEASUREMENT ITEM

MANUFACTURER

MODEL/TYPE

SERIAL NUMBER

ID NUMBER

CONDITION AS-RECEIVED

CUSTOMER

Top Lead Office

TISCH

TE-5028A

2926

Used item

Integrated Research Center Company Limited.

122 Moo 2, Thathoom A.Srimahaphote,

Prachinburi 25140, Thailand.

RECEIVED DATE

10 May 2024

MEASUREMENT DATE

05 Jun 2024

ISSUE DATE

06 Jun 2024

ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follow:

Temperature

23.0 ± 1.0 °C

Relative Humidity

55.0 ± 15.0 %RH

Atmospheric Pressure

1010 ± 10 hPa

CALIBRATION CONDITION:

Preconditioning

24 hours at ambient conditions.

Measurement Condition

The average values during measurement are 22.9 °C and 53.2 %RH.

NOTE: 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.

Calibration procedure:

The Orifice gas flow device was calibrated against Standard Rotary Displacement Meter (Roots Meter) Model : G55/MC/M200. The MP CL 004 was used as a calibration fluid.

Traceability:

This certificate provides a traceability of the measurement to realization of the international system of units (SI) through the NIMT (National Metrology Institute of Thailand) via Certificate number: MW/0003-23.

Uncertainty of Measurement:

The reported uncertainty of measurement is based on the standard uncertainty multiplied by a coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty has been determined in accordance with the GUM (Evaluation of measurement data - Guide to the expression of uncertainty in measurement).

Calibrated by:
☒ Mr. Satewit Thachalad
☐ Miss. Nitirapon Lertsomphol



Approved signature:

Mr. Pannipa Booncharoen
Calibration Department Manager



Calibration point : (0.05, 0.5, 1, 1.5, 2) l/min

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

Atmospheric pressure (1010±13) hPa

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

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

Measurement data :

UUC Value (l/min)	Standard Value (l/min)	Temperature (°C)	Pressure (hPa)	Deviation (%)	Uncertainty (%)
0.05043	0.049841	24.718	1007.90	+1.19	1.4
0.50136	0.49651	24.716	1008.19	+0.98	0.90
1.0045	0.9973	24.693	1008.53	+0.73	0.89
1.5020	1.5012	24.688	1009.04	+0.06	0.89
1.9995	2.0036	24.668	1009.48	-0.20	0.89

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

The end of calibration certificate.

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

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(66) 08 3219 9440
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(66) 08 3889 6827

Continuation of Certificate of Calibration Number COF-013-67

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	Ap_meter mmHg	Ap_Office inH ₂ O	γ	Standard Flow [Q _s] m ³ /min
1	0.703	754.942	22.82	22.17	58.515	1.094	1.046	0.651
2	1.001	754.951	22.99	22.44	44.435	2.340	1.530	0.944
3	1.117	754.835	23.23	22.73	38.752	9.984	1.016	1.060
4	1.170	754.975	23.31	22.88	35.376	3.273	1.804	1.116
5	1.411	755.078	23.55	23.13	24.261	4.921	2.216	1.365

Slope (m):

1.63522

Intercept (b):

-0.01711

Correlation coefficient (r):

0.99975

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	Ap_meter mmHg	Ap_Office inH ₂ O	γ	Standard Flow [Q _s] m ³ /min
1	0.703	754.942	22.82	22.17	58.515	1.094	0.655	0.650
2	1.001	754.951	22.99	22.44	44.435	2.340	0.958	0.944
3	1.117	754.835	23.23	22.73	38.752	2.948	1.076	1.061
4	1.170	754.975	23.31	22.88	35.376	5.275	1.131	1.117
5	1.411	755.078	23.55	23.13	24.261	4.921	1.391	1.367

Slope (m):

1.02416

Intercept (b):

-0.01968

Correlation coefficient (r):

0.99975

Uncertainty (k=2):

0.015 m³/min

End of Certificate of Calibration



THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-68/0159 MTC No. EEL. BP. 80/0168

CALIBRATION CERTIFICATE

Submitted by : Integrated Research Center Company Limited.
Address : 122 Moo 2, T.Thatoom, A.Srimahaphote, Pachinburi, 25140.
Calibrated at : Electrical and Electronic Standards Laboratory, Industrial Metrology and Testing Service Centre.
 Soi 1C, Bangpoo Industrial Estate, Sukhumvit Rd., Muang, Samutprakan 10280.

Instrument Calibrated :
 Description : Sound Calibrator
 Manufacturer : ACO
 Model : 2127
 Serial No. : 100012
Ambient Environment
 Temperature : (23 ± 3) °C
 Relative Humidity : (50 ± 15) %
 Ambient Pressure : (101.325 ± 1.500) kPa

- Standards used :**
1. Digital Function Synthesizer NF Electronic DF-193A S/N 122037.
 2. Measuring Amplifier Bruel&Kjaer 2636 S/N 1537484.
 3. Programmable Attenuator Tamagawa TPA-303A S/N OF 2214.
 4. Digital Multimeter Agilent 34401A S/N MY44005560.
 5. Pressure Transmitter Vaisala PTB202AD S/N T0650001.
 6. Audio Analyzer Panasonic VP-7722A S/N 041477D122.
 7. Condenser Microphone B&K 4180 S/N 2889871.

Calibration Procedure: CP-102-04 based on IEC 60942:2003. The sound pressure level generated by sound calibrator under test shall be measured by standard microphone using an insert voltage technique.

This instrument has been calibrated against standards maintained at Electrical and Electronic Standards Laboratory (EEL), which are traceable to the International System of Units through the National Institute of Metrology (Thailand).

The information on actual reading is attached herewith and the uncertainty limits quoted refer to the measured values only.

Date of Receipt : 14 Jan. 2025
Date of Calibration : 21 Jan. 2025

1/2

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 (66) 08 1889 6827



THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-68/0159 MTC No. EEL. BP. 82/0168

CALIBRATION CERTIFICATE

Submitted by : Integrated Research Center Company Limited.
Address : 122 Moo 2, T.Thatoom, A.Srimahaphote, Pachinburi, 25140.
Calibrated at : Electrical and Electronic Standards Laboratory, Industrial Metrology and Testing Service Centre.
 Soi 1C, Bangpoo Industrial Estate, Sukhumvit Rd., Muang, Samutprakan 10280.

Instrument Calibrated :
 Description : Sound Calibrator
 Manufacturer : Delta Ohm
 Model : HD9102
 Serial No. : 10038483
Ambient Environment
 Temperature : (23 ± 3) °C
 Relative Humidity : (50 ± 15) %
 Ambient Pressure : (101.325 ± 1.500) kPa

- Standards used :**
1. Digital Function Synthesizer NF Electronic DF-193A S/N 122037.
 2. Measuring Amplifier Bruel&Kjaer 2636 S/N 1537484.
 3. Programmable Attenuator Tamagawa TPA-303A S/N OF 2214.
 4. Digital Multimeter Agilent 34401A S/N MY44005560.
 5. Pressure Transmitter Vaisala PTB202AD S/N T0650001.
 6. Audio Analyzer Panasonic VP-7722A S/N 041477D122.
 7. Condenser Microphone B&K 4180 S/N 2889871.

Calibration Procedure: CP-102-04 based on IEC 60942:2003. The sound pressure level of instrument was measured by standard microphone using an insert voltage technique.

This instrument has been calibrated against standards maintained at Electrical and Electronic Standards Laboratory (EEL), which are traceable to the International System of Units through the National Institute of Metrology (Thailand).

The information on actual reading is attached herewith and the uncertainty limits quoted refer to the measured values only.

Date of Receipt : 14 Jan. 2025
Date of Calibration : 22 Jan. 2025

1/3

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THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-68/0159 MTC No. EEL. BP. 80/0168

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%.

Nominal Output of Unit Under Test = 94 dB re 20μPa at 1000 Hz

Acoustic Output in dB re 20μPa, Corrected to Reference Conditions: 101.325 kPa, 23.0 °C and 50 %RH

1. Sound Pressure Level

Standard Microphone Type	Measured Sound Pressure Level (dB)	Deviated value (dB)	Uncertainty (dB)	Tolerance limit IEC60942:2003 Class 1
1/2 inch Bruel&Kjaer 4180	93.91	-0.09	± 0.10	±0.40 dB

2. Frequency

Standard Microphone Type	Measured Frequency (Hz)	Deviated value (Hz)	Uncertainty (Hz)	Tolerance limit IEC60942:2003 Class 1
1/2 inch Bruel&Kjaer 4180	1000.0	0.0	± 1.5	±1.0%

3. Total Distortion

Standard Microphone Type	Measured Total Distortion (%)	Uncertainty (%)	Tolerance limit IEC60942:2003 Class 1
1/2 inch Bruel&Kjaer 4180	1.50	± 0.50	±3.0%

- Note :**
1. No adjustment.
 2. The calibrator pressure correction was not included.
 3. The microphone volume correction was not included.

Calibrated by :
 (Mr. Weerachai Deechaiyae)

Approved by :
 Director

Electrical and Electronic Standards Laboratory
 Industrial Metrology and Testing Service Centre

Date of Calibration : 21 Jan. 2025
Date of Issue : 23 Jan. 2025

Ref : 2011268011400184001

End of Certificate

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THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-68/0159 MTC No. EEL. BP. 82/0168

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%.

Nominal Output of Unit Under Test = 94 dB re 20μPa at 1000 Hz

Acoustic Output in dB re 20μPa, Corrected to Reference Conditions : 101.325 kPa, 23.0°C and 50 %RH

1. Sound Pressure Level

Standard Microphone Type	Measured Sound Pressure Level (dB)	Deviated value (dB)	Uncertainty (dB)	Tolerance limit IEC60942:2003 Class 2
1/2 inch Bruel&Kjaer 4180	93.88	-0.12	± 0.10	±0.75 dB

2. Frequency

Standard Microphone Type	Measured Frequency (Hz)	Deviated value (Hz)	Uncertainty (Hz)	Tolerance limit IEC60942:2003 Class 2
1/2 inch Bruel&Kjaer 4180	988.3	-11.7	± 1.5	±2.0%

3. Total distortion

Standard Microphone Type	Measured Total distortion (%)	Uncertainty (%)	Tolerance limit IEC60942:2003 Class 2
1/2 inch Bruel&Kjaer 4180	1.00	± 0.50	±4.0%

- Note :**
1. No adjustment.
 2. The calibrator pressure correction was not included.
 3. The microphone volume correction was not included.

Date of Calibration : 22 Jan. 2025

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THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-68/0159

MTC No. EEL. BP. 82/0168

Nominal Output of Unit Under Test = 114 dB re 20μPa at 1000 Hz

Acoustic Output in dB re 20μPa, Corrected to Reference Conditions : 101.325 kPa, 23.0 °C and 50 %RH

1. Sound Pressure Level

Standard Microphone Type	Measured Sound Pressure Level (dB)	Deviated value (dB)	Uncertainty (dB)	Tolerance limit IEC60942:2003 Class 2
1/2 inch Brüel&Kjaer 4180	113.86	-0.14	± 0.10	± 0.75 dB

2. Frequency

Standard Microphone Type	Measured Frequency (Hz)	Deviated value (Hz)	Uncertainty (Hz)	Tolerance limit IEC60942:2003 Class 2
1/2 inch Brüel&Kjaer 4180	988.4	-11.6	± 1.5	± 2.0%

3. Total Distortion

Standard Microphone Type	Measured Total Distortion (%)	Uncertainty (%)	Tolerance limit IEC60942:2003 Class 2
1/2 inch Brüel&Kjaer 4180	0.21	± 0.50	± 4.0%

Note : 1. No adjustment.

2. The calibrator pressure correction was not included.

3. The microphone volume correction was not included.

Calibrated by :

(Mr. Weerachai Deechaiyae)

Approved by :

(Mr. Prayoon Klaiyapa)

Director

Electrical and Electronic Standards Laboratory

Industrial Metrology and Testing Service Centre

Date of Calibration : 22 Jan. 2025

Date of Issue : 23 Jan. 2025

Ref : 2011268011400184003

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THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-68/0159

MTC No. EEL. BP. 81/0168

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%.

Nominal Output of Unit Under Test = 94 dB re 20μPa at 1000 Hz

Acoustic Output in dB re 20μPa, Corrected to Reference Conditions : 101.325 kPa, 23.0 °C and 50 %RH

1. Sound Pressure Level

Standard Microphone Type	Measured Sound Pressure Level (dB)	Deviated value (dB)	Uncertainty (dB)	Tolerance limit IEC60942:2003 Class 1
1/2 inch Brüel&Kjaer 4180	93.91	-0.09	± 0.10	± 0.40 dB

2. Frequency

Standard Microphone Type	Measured Frequency (Hz)	Deviated value (Hz)	Uncertainty (Hz)	Tolerance limit IEC60942:2003 Class 1
1/2 inch Brüel&Kjaer 4180	1001.5	1.5	± 1.5	± 1.0%

3. Total Distortion

Standard Microphone Type	Measured Total Distortion (%)	Uncertainty (%)	Tolerance limit IEC60942:2003 Class 1
1/2 inch Brüel&Kjaer 4180	1.35	± 0.50	± 3.0%

Note : 1. No adjustment.

2. The calibrator pressure correction was not included.

3. The microphone volume correction was included at level of 0.16 dB from manual.

Calibrated by :

(Mr. Weerachai Deechaiyae)

Approved by :

(Mr. Prayoon Klaiyapa)

Director

Electrical and Electronic Standards Laboratory

Industrial Metrology and Testing Service Centre

Date of Calibration : 22 Jan. 2025

Date of Issue : 23 Jan. 2025

Ref : 2011268011400184002

End of Certificate

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THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-68/0159

MTC No. EEL. BP. 81/0168

CALIBRATION CERTIFICATE

Submitted by : Integrated Research Center Company Limited.

Address : 122 Moo 2, T.Thatoom, A.Srimahaphote, Pachinburi, 25140.

Calibrated at : Electrical and Electronic Standards Laboratory, Industrial Metrology and Testing Service Centre.
Soi 1C, Bangpoo Industrial Estate, Sukhumvit Rd., Muang, Samutprakan 10280.

Instrument Calibrated :

Description : Sound Calibrator

Manufacturer : Rion

Model : NC-74

Serial No. : 35046798

Ambient Environment

Temperature : (23 ± 3) °C

Relative Humidity : (50 ± 15) %

Ambient Pressure : (101.325 ± 1.500) kPa

Standards used : 1. Digital Function Synthesizer NF Electronic DF-193A S/N 122037.

2. Measuring Amplifier Brüel&Kjaer 2636 S/N 1537484.

3. Programmable Attenuator Tamagawa TPA-303A S/N OF 2214.

4. Digital Multimeter Agilent 34401A S/N MY4005560.

5. Pressure Transmitter Vaisala PTB202AD S/N T0650001.

6. Audio Analyzer Panasonic VP-7722A S/N 041477D122.

7. Condenser Microphone B&K 4180 S/N 2633526.

Calibration Procedure: CP-102-04 based on IEC 60942:2003; The sound pressure level generated by sound calibrator under test shall be measured by standard microphone using an insert voltage technique.

This instrument has been calibrated against standards maintained at Electrical and Electronic Standards Laboratory (EEL), which are traceable to the International System of Units through the National Institute of Metrology (Thailand).

The information on actual reading is attached herewith and the uncertainty limits quoted refer to the measured values only.

Date of Receipt : 14 Jan. 2025

Date of Calibration : 22 Jan. 2025

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THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-68/0160

MTC No. EEL. BP. 89/0168

CALIBRATION CERTIFICATE

Submitted by : Integrated Research Center Company Limited.

Address : 122 Moo 2, T.Thatoom, A.Srimahaphote, Prachinburi, 25140.

Calibrated at : Electrical and Electronic Standards Laboratory, Industrial Metrology and Testing Service Centre.
Soi 1C, Bangpoo Industrial Estate, Sukhumvit Rd., A.Muang, Samutprakan 10280.

Instrument Calibrated :

Description : Integrating Sound Level Meter

Manufacturer : ACO

Model : 6226

Serial No. : 100144

Microphone : Type 7052 No.79844

Preamplifier : -

Ambient Environment

Temperature : (23 ± 3) °C

Relative Humidity : (50 ± 15) %

Ambient Pressure : (101.325 ± 1.5) kPa

Standards used :

1. Band Pass Filter Stanford Research Systems SR 650 S/N 28712.
2. Condenser Microphone Brüel&Kjaer 4180 S/N 2889871.
3. Decade Attenuator Ando AL-205 S/N 00464602.
4. Function/Arbitrary Waveform Generator Agilent 33220A S/N MY44042668.
5. Digital Function Synthesizer NF Electronic Instruments DF-193A S/N 122037.
6. Sound Calibrator Brüel&Kjaer 4231 S/N 3015154.
7. Measuring Amplifier Brüel&Kjaer 2636 S/N 1537484.

Date of Receipt : 14 Jan. 2025

Date of Calibration : 17-18 Feb. 2025

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THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-68/0160

MTC No. EEL. BP. 89/0168

8. Power Amplifier Brüel&Kjær 2706 S/N 1517650.
9. Speaker Tannoy Limited, Great Britain British Patent No. 215300.
10. Digital Multimeter Agilent 34401A S/N MY44005560.
11. Programmable Attenuator Tamagawa TPA-303A S/N 2212.

Calibration Procedure :

This instrument was calibrated by using calibration procedures no CP-102-02 and CP-102-03, which were based on IEC 61672-3 Electroacoustics - Sound Level Meters - Part 3 : Periodic tests (2013). These calibration procedures were related to the electrical and acoustic signal tests. The electrical signal test was carried out with the direct measurement method. The acoustic signal test was performed in an anechoic room with the comparison measurement method.

This instrument has been calibrated against standards maintained at the Electrical and Electronic Standards Laboratory (EEL), which are traceable to the International System of Units through the National Institute of Metrology (Thailand).

The information on actual reading is attached herewith and the uncertainty limits quoted refer to the measured values only.

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%.

Date of Calibration : 17-18 Feb. 2025

2/9

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THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-68/0160

MTC No. EEL. BP. 89/0168

I. Absolute Sensitivity

Reference Acoustic Signal (dB)	Measured value (dB)		Deviation value (dB)	Acceptance limit Class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
	Before adjust	After adjust				
93.99	93.7	94.0	0.0	1.0	0.30	N/A

Note: The external calibration adjustment was firstly performed. The internal calibration adjustment was then completed at the display of 115.1 dB.

2. Self-generated noise**2.1 Normal test**

Measured value (dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
18.5	0.10	N/A

2.2 The microphone of the sound level meter was replaced by electrical signal input device

Frequency Weighting	Measured value (dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
A-Weight	16.3	0.10	N/A
C-Weight	24.7	0.10	N/A
Flat	26.7	0.10	N/A

Date of Calibration : 17-18 Feb. 2025

3/9

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THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-68/0160

MTC No. EEL. BP. 89/0168

3. Acoustical signal test of frequency weightings

Frequency (Hz)	Deviation from frequency response (dB)			Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
	A-weight	C-weight	Flat			
125	-0.3	0.2	0.1	1.5	0.45	0.6
1 000	-0.1	-0.1	0.0	1.0	0.45	0.6
8 000	-4.8	-4.7	-4.8	5.0	0.45	0.7

4. Electrical signal test of frequency weightings

Frequency (Hz)	Deviation from frequency response (dB)			Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
	A-weight	C-weight	Flat			
63	0.2	0.1	0.1	2.0	0.20	0.6
125	0.1	0.2	0.1	1.5	0.20	0.6
250	0.2	0.1	0.1	1.5	0.20	0.6
500	0.1	0.0	0.0	1.5	0.20	0.6
1 000	0.0	0.0	0.0	1.0	0.20	0.6
2 000	-0.1	0.0	0.1	2.0	0.20	0.6
4 000	-0.4	-0.2	0.0	3.0	0.20	0.6
8 000	-0.4	-0.2	-0.1	5.0	0.20	0.7

Date of Calibration : 17-18 Feb. 2025

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THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-68/0160

MTC No. EEL. BP. 89/0168

5. Long-term stability

Time	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Begin	94.0	0.0	0.3	0.10	0.1
End	94.0				

6. Frequency and time weightings at 1 kHz**6.1 Frequency weightings at 1 kHz**

Frequency Weighting	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
A-weight	94.0	0.0	0.2	0.20	0.2
C-weight	94.0	0.0	0.2	0.20	0.2
Flat	94.1	0.1	0.2	0.20	0.2

6.2 Time weightings at 1 kHz

Frequency Weighting	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Fast	94.0	0.0	0.1	0.20	0.2
Slow	94.0	0.0	0.1	0.20	0.2
Leq	94.0	0.0	0.1	0.20	0.2

Date of Calibration : 17-18 Feb. 2025

5/9

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7. Level linearity on the reference level range

Anticipated value (dB)	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
122	122.0	0.0	1.1	0.30	0.3
121	121.1	0.1	1.1	0.30	0.3
120	120.0	0.0	1.1	0.30	0.3
119	119.1	0.1	1.1	0.30	0.3
114	114.0	0.0	1.1	0.30	0.3
109	109.0	0.0	1.1	0.30	0.3
104	104.0	0.0	1.1	0.30	0.3
99	99.1	0.1	1.1	0.30	0.3
94	94.0	0.0	1.1	0.30	0.3
89	89.0	0.0	1.1	0.30	0.3
84	84.1	0.1	1.1	0.30	0.3
79	79.1	0.1	1.1	0.30	0.3
74	74.1	0.1	1.1	0.30	0.3
69	69.1	0.1	1.1	0.30	0.3
64	64.0	0.0	1.1	0.30	0.3
59	59.0	0.0	1.1	0.30	0.3
54	54.0	0.0	1.1	0.30	0.3
49	49.0	0.0	1.1	0.30	0.3
44	44.1	0.1	1.1	0.30	0.3
39	39.0	0.0	1.1	0.30	0.3
34	34.1	0.1	1.1	0.30	0.3
33	33.1	0.1	1.1	0.30	0.3

Date of Calibration : 17-18 Feb. 2025

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(66) 08 1889 6827

8. Level linearity including the level range control

At reference level at 5 dB greater than the under-range on a level range

Range	Anticipated value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
40-130	45	45.0	0.0	1.1	0.30	0.3
30-120	35	35.0	0.0	1.1	0.30	0.3
20-110	25	25.5	0.5	1.1	0.30	0.3
20-100	25	25.5	0.5	1.1	0.30	0.3
20-90	25	25.4	0.4	1.1	0.30	0.3
20-80	25	25.4	0.4	1.1	0.30	0.3

9. Tone burst response

Time Weighing	Toneburst Duration, Th (ms)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Fast	200	115.8	-0.2	±1.0	0.20	0.3
	2	98.8	-0.2	+1.0; -2.5	0.20	0.3
	0.25	89.6	-0.4	+1.5; -5.0	0.20	0.3
Slow	200	109.4	-0.2	±1.0	0.20	0.3
	2	89.8	-0.2	+1.0; -5.0	0.20	0.3
SEL	200	109.9	-0.1	±1.0	0.20	0.3
	2	90.0	0.0	+1.0; -2.5	0.20	0.3
	0.25	80.9	-0.1	+1.5; -5.0	0.20	0.3

Date of Calibration : 17-18 Feb. 2025

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7. Level linearity on the reference level range

Anticipated value (dB)	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
32	32.1	0.1	1.1	0.30	0.3
31	31.3	0.3	1.1	0.30	0.3
30	30.3	0.3	1.1	0.30	0.3

8. Level linearity including the level range control

At reference sound level on the reference level range

Range	Anticipated value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
40-130	94.0	94.0	0.0	1.1	0.30	0.3
30-120	94.0	94.0	0.0	1.1	0.30	0.3
20-110	94.0	94.0	0.0	1.1	0.30	0.3
20-100	94.0	94.0	0.0	1.1	0.30	0.3

Date of Calibration : 17-18 Feb. 2025

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10. Peak C sound level

Number of cycles in test signal	Anticipated value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Complete cycle	125.4	125.8	0.4	3.0	0.20	0.35
Positive half cycle	124.4	124.2	-0.2	2.0	0.20	0.35
Negative half cycle	124.4	124.2	-0.2	2.0	0.20	0.35

11. Overload indication

Measured value (dB)		Deviated	Acceptance limit	Uncertainty	Maximum-permitted uncertainty
Positive one-half cycle	Negative one-half cycle	value (dB)	class 2 (±dB)	(±dB)	of measurement (±dB)
131.1	131.1	0.0	1.5	0.20	0.25

12. High-level stability

Time	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Begin	129.0	0.0	0.3	0.10	0.1
End	129.0				

Calibrated by : 
(Mr. Pannasit Phasingri)

Approved by : 
(Mr. Pannasit Phasingri)

Date of Calibration : 17-18 Feb. 2025

Date of Issue : 24 Feb. 2025

End of Certificate

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THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-68/0160

MTC No. EEL. BP. 90/0168

CALIBRATION CERTIFICATE

Submitted by : Integrated Research Center Company Limited.

Address : 122 Moo 2, T.Thatoom, A.Srimahaphote, Prachinburi, 25140.

Calibrated at : Electrical and Electronic Standards Laboratory, Industrial Metrology and Testing Service Centre.
Soi 1C, Bangpoo Industrial Estate, Sukhumvit Rd., A.Muang, Samutprakan 10280.

Instrument Calibrated :

Description : Integrating Sound Level Meter

Manufacturer : ACO

Model : 6226

Serial No. : 100145

Microphone : Type 7052NR No.78402

Preamplifier : -

Standards used :

1. Band Pass Filter Stanford Research Systems SR 650 S/N 28712.
2. Condenser Microphone Brüel&Kjaer 4180 S/N 2889871.
3. Decade Attenuator Ando AL-205 S/N 00464602.
4. Function/Arbitrary Waveform Generator Agilent 33220A S/N MY44042608.
5. Digital Function Synthesizer NF Electronic Instruments DF-193A S/N 122037.
6. Sound Calibrator Brüel&Kjaer 4231 S/N 3015154.
7. Measuring Amplifier Brüel&Kjaer 2636 S/N 1537484.

Date of Receipt : 14 Jan. 2025

Date of Calibration : 17-18 Feb. 2025

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THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-68/0160

MTC No. EEL. BP. 90/0168

1. Absolute Sensitivity

Reference Acoustic Signal (dB)	Measured value (dB)		Deviation value (dB)	Acceptance limit Class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
	Before adjust	After adjust				
93.99	92.9	94.0	0.0	1.0	0.30	N/A

Note: The external calibration adjustment was firstly performed. The internal calibration adjustment was then completed at the display of 117.0 dB.

2. Self-generated noise

2.1 Normal test

Measured value (dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
25.3	0.10	N/A

2.2 The microphone of the sound level meter was replaced by electrical signal input device

Frequency Weighting	Measured value (dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
A-Weight	24.5	0.10	N/A
C-Weight	26.7	0.10	N/A
Flat	31.3	0.10	N/A

Date of Calibration : 17-18 Feb. 2025

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THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-68/0160

MTC No. EEL. BP. 90/0168

8. Power Amplifier Brüel&Kjaer 2706 S/N 1517650.

9. Speaker Tannoy Limited, Great Britain British Patent No. 215300.

10. Digital Multimeter Agilent 34401A S/N MY44005560.

11. Programmable Attenuator Tamagawa TPA-303A S/N 2212.

Calibration Procedure :

This instrument was calibrated by using calibration procedures no CP-102-02 and CP-102-03, which were based on IEC 61672-3 Electroacoustics - Sound Level Meters - Part 3 : Periodic tests (2013). These calibration procedures were related to the electrical and acoustic signal tests. The electrical signal test was carried out with the direct measurement method. The acoustic signal test was performed in an anechoic room with the comparison measurement method.

This instrument has been calibrated against standards maintained at the Electrical and Electronic Standards Laboratory (EEL), which are traceable to the International System of Units through the National Institute of Metrology (Thailand).

The information on actual reading is attached herewith and the uncertainty limits quoted refer to the measured values only.

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%.

Date of Calibration : 17-18 Feb. 2025

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Request No. 21-68/0160

MTC No. EEL. BP. 90/0168

3. Acoustical signal test of frequency weightings

Frequency (Hz)	Deviation from frequency response (dB)			Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
	A-weight	C-weight	Flat			
125	0.4	0.1	-0.1	1.5	0.45	0.6
1 000	0.1	0.2	0.2	1.0	0.45	0.6
8 000	-4.2	-3.6	-4.4	5.0	0.45	0.7

4. Electrical signal test of frequency weightings

Frequency (Hz)	Deviation from frequency response (dB)			Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
	A-weight	C-weight	Flat			
63	0.1	0.1	0.1	2.0	0.20	0.6
125	0.1	0.1	0.1	1.5	0.20	0.6
250	0.1	0.1	0.1	1.5	0.20	0.6
500	0.1	0.0	0.0	1.5	0.20	0.6
1 000	0.0	0.0	0.0	1.0	0.20	0.6
2 000	-0.1	0.0	0.1	2.0	0.20	0.6
4 000	-0.3	-0.1	0.0	3.0	0.20	0.6
8 000	-0.3	-0.1	-0.1	5.0	0.20	0.7

Date of Calibration : 17-18 Feb. 2025

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5. Long-term stability

Time	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Begin	94.0	0.0	0.3	0.10	0.1
End	94.0				

6. Frequency and time weightings at 1 kHz

6.1 Frequency weightings at 1 kHz

Frequency Weighting	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
A-weight	94.0	0.0	0.2	0.20	0.2
C-weight	94.0	0.0	0.2	0.20	0.2
Flat	94.1	0.1	0.2	0.20	0.2

6.2 Time weightings at 1 kHz

Frequency Weighting	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Fast	94.0	0.0	0.1	0.20	0.2
Slow	94.0	0.0	0.1	0.20	0.2
Leq	94.0	0.0	0.1	0.20	0.2

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7. Level linearity on the reference level range

Anticipated value (dB)	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
122	121.9	-0.1	1.1	0.30	0.3
121	120.9	-0.1	1.1	0.30	0.3
120	119.9	-0.1	1.1	0.30	0.3
119	119.0	0.0	1.1	0.30	0.3
114	113.9	-0.1	1.1	0.30	0.3
109	108.9	-0.1	1.1	0.30	0.3
104	103.9	-0.1	1.1	0.30	0.3
99	99.0	0.0	1.1	0.30	0.3
94	94.0	0.0	1.1	0.30	0.3
89	88.9	-0.1	1.1	0.30	0.3
84	84.0	0.0	1.1	0.30	0.3
79	79.0	0.0	1.1	0.30	0.3
74	74.0	0.0	1.1	0.30	0.3
69	69.0	0.0	1.1	0.30	0.3
64	63.9	-0.1	1.1	0.30	0.3
59	58.9	-0.1	1.1	0.30	0.3
54	53.9	-0.1	1.1	0.30	0.3
49	48.9	-0.1	1.1	0.30	0.3
44	44.0	0.0	1.1	0.30	0.3
39	38.9	-0.1	1.1	0.30	0.3
34	34.0	0.0	1.1	0.30	0.3
33	33.1	0.1	1.1	0.30	0.3

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7. Level linearity on the reference level range

Anticipated value (dB)	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
32	32.2	0.2	1.1	0.30	0.3
31	31.2	0.2	1.1	0.30	0.3
30	30.3	0.3	1.1	0.30	0.3

8. Level linearity including the level range control

At reference sound level on the reference level range

Range	Anticipated value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
40-130	94.0	94.0	0.0	1.1	0.30	0.3
30-120	94.0	94.0	0.0	1.1	0.30	0.3
20-110	94.0	94.0	0.0	1.1	0.30	0.3
20-100	94.0	94.0	0.0	1.1	0.30	0.3

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8. Level linearity including the level range control

At reference level at 5 dB greater than the under-range on a level range

Range	Anticipated value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
40-130	45	45.0	0.0	1.1	0.30	0.3
30-120	35	35.0	0.0	1.1	0.30	0.3
20-110	25	25.4	0.4	1.1	0.30	0.3
20-100	25	25.5	0.5	1.1	0.30	0.3
20-90	25	25.6	0.6	1.1	0.30	0.3
20-80	25	25.5	0.5	1.1	0.30	0.3

9. Tone burst response

Time Weighting	Toneburst Duration, Tb (ms)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Fast	200	115.8	-0.2	±1.0	0.20	0.3
	2	98.8	-0.2	+1.0; -2.5	0.20	0.3
	0.25	89.6	-0.4	+1.5; -5.0	0.20	0.3
Slow	200	109.4	-0.2	±1.0	0.20	0.3
	2	89.8	-0.2	+1.0; -5.0	0.20	0.3
SEL	200	109.9	-0.1	±1.0	0.20	0.3
	2	90.0	0.0	+1.0; -2.5	0.20	0.3
	0.25	80.9	-0.1	+1.5; -5.0	0.20	0.3

Date of Calibration : 17-18 Feb. 2025

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10. Peak C sound level

Number of cycles in test signal	Anticipated value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Complete cycle	125.4	125.8	0.4	3.0	0.20	0.35
Positive half cycle	124.4	124.2	-0.2	2.0	0.20	0.35
Negative half cycle	124.4	124.2	-0.2	2.0	0.20	0.35


11. Overload indication

Measured value (dB)		Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Positive one-half cycle	Negative one-half cycle				
131.1	131.1	0.0	1.5	0.20	0.25

12. High-level stability

Time	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Begin	129.0	0.0	0.3	0.10	0.1
End	129.0				

Calibrated by 
(Mr. Pannasit Phasingri)

Approved by: 
(Mr. Pawate Khueypan)
Director
Electrical and Electronic Standards Laboratory
Industrial Metrology and Testing Service Centre
Ref: 2011268011400185008

Date of Calibration : 17-18 Feb. 2025

Date of Issue : 24 Feb. 2025

End of Certificate

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

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8. Power Amplifier Brüel&Kjær 2706 S/N 1517650.
9. Speaker Tannoy Limited, Great Britain British Patent No. 215300.
10. Digital Multimeter Agilent 34401A S/N MY44005560.
11. Programmable Attenuator Tamagawa TPA-303A S/N 2212.

Calibration Procedure :

This instrument was calibrated by using calibration procedures no CP-102-02 and CP-102-03, which were based on IEC 61672-3 Electroacoustics - Sound Level Meters - Part 3 : Periodic tests (2013). These calibration procedures were related to the electrical and acoustic signal tests. The electrical signal test was carried out with the direct measurement method. The acoustic signal test was performed in an anechoic room with the comparison measurement method.

This instrument has been calibrated against standards maintained at the Electrical and Electronic Standards Laboratory (EEL), which are traceable to the International System of Units through the National Institute of Metrology (Thailand).

The information on actual reading is attached herewith and the uncertainty limits quoted refer to the measured values only.

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%.

Date of Calibration : 17-18 Feb. 2025

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Tel. (66) 0 2579 1121-30 ext. 5219, 5225, 5217
(66) 08 1889 6827

CALIBRATION CERTIFICATE

Submitted by : Integrated Research Center Company Limited.

Address : 122 Moo 2, T.Thatoom, A.Srimahaphote, Prachinburi, 25140.

Calibrated at : Electrical and Electronic Standards Laboratory, Industrial Metrology and Testing Service Centre.
Soi 1C, Bangpoo Industrial Estate, Sukhumvit Rd., A.Muang, Samutprakan 10280.

Instrument Calibrated :

Description : Integrating Sound Level Meter

Manufacturer : ACO

Model : 6226

Serial No. : 100146

Microphone : Type 7052NR No.78402

Preamplifier : -

Ambient Environment

Temperature : (23 ± 3) °C

Relative Humidity : (50 ± 15) %

Ambient Pressure : (101.325 ± 1.5) kPa

Standards used :

1. Band Pass Filter Stanford Research Systems SR 650 S/N 28712.
2. Condenser Microphone Brüel&Kjær 4180 S/N 2889871.
3. Decade Attenuator Ando AL-205 S/N 00464602.
4. Function/Arbitrary Waveform Generator Agilent 33220A S/N MY44042668.
5. Digital Function Synthesizer NF Electronic Instruments DF-193A S/N 122037.
6. Sound Calibrator Brüel&Kjær 4231 S/N 3015154.
7. Measuring Amplifier Brüel&Kjær 2636 S/N 1537484.

Date of Receipt : 14 Jan. 2025

Date of Calibration : 17-18 Feb. 2025

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1. Absolute Sensitivity

Reference Acoustic Signal (dB)	Measured value (dB)		Deviation value (dB)	Acceptance limit Class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
	Before adjust	After adjust				
93.99	92.7	94.0	0.0	1.0	0.30	N/A

Note: The external calibration adjustment was firstly performed. The internal calibration adjustment was then completed at the display of 95.1 dB.

2. Self-generated noise

2.1 Normal test

Measured value (dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
23.1	0.10	N/A

2.2 The microphone of the sound level meter was replaced by electrical signal input device

Frequency Weighting	Measured value (dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
A-Weight	22.5	0.10	N/A
C-Weight	27.6	0.10	N/A
Flat	30.1	0.10	N/A

Date of Calibration : 17-18 Feb. 2025

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3. Acoustical signal test of frequency weightings

Frequency (Hz)	Deviation from frequency response (dB)			Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
	A-weight	C-weight	Flat			
125	0.7	0.5	0.0	1.5	0.45	0.6
1 000	0.2	0.1	0.1	1.0	0.45	0.6
8 000	-4.4	-4.2	-4.4	5.0	0.45	0.7

4. Electrical signal test of frequency weightings

Frequency (Hz)	Deviation from frequency response (dB)			Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
	A-weight	C-weight	Flat			
63	0.3	0.1	0.1	2.0	0.20	0.6
125	0.1	0.1	1.3	1.5	0.20	0.6
250	0.1	0.1	0.1	1.5	0.20	0.6
500	0.1	0.0	0.0	1.5	0.20	0.6
1 000	0.0	0.0	0.0	1.0	0.20	0.6
2 000	-0.1	0.0	0.1	2.0	0.20	0.6
4 000	-0.4	-0.2	0.0	3.0	0.20	0.6
8 000	-0.3	-0.2	-0.1	5.0	0.20	0.7

Date of Calibration : 17-18 Feb. 2025

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7. Level linearity on the reference level range

Anticipated value (dB)	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
122	121.8	-0.2	1.1	0.30	0.3
121	120.9	-0.1	1.1	0.30	0.3
120	119.9	-0.1	1.1	0.30	0.3
119	118.9	-0.1	1.1	0.30	0.3
114	113.9	-0.1	1.1	0.30	0.3
109	108.9	-0.1	1.1	0.30	0.3
104	103.9	-0.1	1.1	0.30	0.3
99	99.0	0.0	1.1	0.30	0.3
94	94.0	0.0	1.1	0.30	0.3
89	88.9	-0.1	1.1	0.30	0.3
84	84.1	0.1	1.1	0.30	0.3
79	78.9	-0.1	1.1	0.30	0.3
74	73.9	-0.1	1.1	0.30	0.3
69	68.9	-0.1	1.1	0.30	0.3
64	63.9	-0.1	1.1	0.30	0.3
59	58.8	-0.2	1.1	0.30	0.3
54	53.9	-0.1	1.1	0.30	0.3
49	48.9	-0.1	1.1	0.30	0.3
44	44.2	0.2	1.1	0.30	0.3
39	39.0	0.0	1.1	0.30	0.3
34	34.1	0.1	1.1	0.30	0.3
33	33.2	0.2	1.1	0.30	0.3

Date of Calibration : 17-18 Feb. 2025

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5. Long-term stability

Time	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Begin	94.0	0.0	0.3	0.10	0.1
End	94.0				

6. Frequency and time weightings at 1 kHz

6.1 Frequency weightings at 1 kHz

Frequency Weighting	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
A-weight	94.0	0.0	0.2	0.20	0.2
C-weight	94.0	0.0	0.2	0.20	0.2
Flat	94.1	0.1	0.2	0.20	0.2

6.2 Time weightings at 1 kHz

Frequency Weighting	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Fast	94.0	0.0	0.1	0.20	0.2
Slow	94.0	0.0	0.1	0.20	0.2
Leq	94.0	0.0	0.1	0.20	0.2

Date of Calibration : 17-18 Feb. 2025

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7. Level linearity on the reference level range

Anticipated value (dB)	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
32	32.3	0.3	1.1	0.30	0.3
31	31.4	0.4	1.1	0.30	0.3
30	30.4	0.4	1.1	0.30	0.3

8. Level linearity including the level range control

At reference sound level on the reference level range

Range	Anticipated value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
40-130	94.0	94.0	0.0	1.1	0.30	0.3
30-120	94.0	94.0	0.0	1.1	0.30	0.3
20-110	94.0	94.0	0.0	1.1	0.30	0.3
20-100	94.0	94.0	0.0	1.1	0.30	0.3

Date of Calibration : 17-18 Feb. 2025

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8. Level linearity including the level range control

At reference level at 5 dB greater than the under-range on a level range

Range	Anticipated value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
40-130	45	45.0	0.0	1.1	0.30	0.3
30-120	35	35.0	0.0	1.1	0.30	0.3
20-110	25	25.8	0.8	1.1	0.30	0.3
20-100	25	25.8	0.8	1.1	0.30	0.3
20-90	25	25.6	0.6	1.1	0.30	0.3
20-80	25	25.7	0.7	1.1	0.30	0.3

9. Tone burst response

Time Weighting	Toneburst Duration, Tb (ms)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Fast	200	115.8	-0.2	±1.0	0.20	0.3
	2	98.8	-0.2	+1.0; -2.5	0.20	0.3
	0.25	89.6	-0.4	+1.5; -5.0	0.20	0.3
Slow	200	109.4	-0.2	±1.0	0.20	0.3
	2	89.8	-0.2	+1.0; -5.0	0.20	0.3
SEL	200	109.9	-0.1	±1.0	0.20	0.3
	2	90.0	0.0	+1.0; -2.5	0.20	0.3
	0.25	80.9	-0.1	+1.5; -5.0	0.20	0.3

Date of Calibration : 17-18 Feb. 2025

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10. Peak C sound level

Number of cycles in test signal	Anticipated value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Complete cycle	125.4	125.8	0.4	3.0	0.20	0.35
Positive half cycle	124.4	124.2	-0.2	2.0	0.20	0.35
Negative half cycle	124.4	124.2	-0.2	2.0	0.20	0.35


11. Overload indication

Measured value (dB)		Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Positive one-half cycle	Negative one-half cycle				
131.1	131.1	0.0	1.5	0.20	0.25

12. High-level stability

Time	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Begin	129.0	0.0	0.3	0.10	0.1
End	129.0				

Calibrated by 
(Mr. Pannasit Phasingsri)

Approved by: 
(Mr. Prawate Khunspa)
Director
Electrical and Electronic Standards Laboratory
Industrial Metrology and Testing Service Centre
Ref: 2011268011400185009

Date of Calibration : 17-18 Feb. 2025

Date of Issue : 24 Feb. 2025

End of Certificate

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CALIBRATION CERTIFICATE

Submitted by : Integrated Research Center Company Limited.

Address : 122 Moo 2, T.Thatoom, A.Srimahaphote, Prachinburi, 25140.

Calibrated at : Electrical and Electronic Standards Laboratory, Industrial Metrology and Testing Service Centre.

Soi 1C, Bangpoo Industrial Estate, Sukhumvit Rd., A.Muang, Samutprakan 10280.

Instrument Calibrated :

Description : Sound Level Meter
Manufacturer : Delta OHM
Model : HD 2010UC
Serial No. : 11040842479
Microphone : Type UC-52 No.114674
Preamplifier : Delta Type HD2010PNE2 No.11001018

Ambient Environment

Temperature : (23 ± 3) °C
Relative Humidity : (50 ± 15) %
Ambient Pressure : (101.325 ± 1.5) kPa

Standards used :

1. Band Pass Filter Stanford Research Systems SR 650 S/N 28712.
2. Condenser Microphone Brüel&Kjaer 4180 S/N 2889871.
3. Decade Attenuator Ando AL-205 S/N 00464602.
4. Function/Arbitrary Waveform Generator Agilent 33220A S/N MY44042668.
5. Digital Function Synthesizer NF Electronic Instruments DF-193A S/N 120307.
6. Sound Calibrator Brüel&Kjaer 4231 S/N 3015154.
7. Measuring Amplifier Brüel&Kjaer 2636 S/N 1537484.

Date of Receipt : 14 Jan. 2025

Date of Calibration : 17-18 Feb. 2025

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11. Programmable Attenuator Tamagawa TPA-303A S/N 2212.

Calibration Procedure :

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The information on actual reading is attached herewith and the uncertainty limits quoted refer to the measured values only.

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%.

Date of Calibration : 17-18 Feb. 2025

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1. Absolute Sensitivity

Reference Acoustic Signal (dB)	Measured value (dB)		Deviation value (dB)	Acceptance limit Class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
	Before adjust	After adjust				
93.95	93.3	94.0	0.1	1.0	0.30	N/A

Note: The external calibration adjustment was firstly performed. The internal calibration adjustment was then completed at the display of 94.0 dB.

2. Self-generated noise

2.1 Normal test

Measured value (dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
19.6	0.10	N/A

2.2 The microphone of the sound level meter was replaced by electrical signal input device

Frequency Weighting	Measured value (dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
A-Weight	18.3	0.10	N/A
C-Weight	24.5	0.20	N/A
Flat	26.9	0.30	N/A

Date of Calibration : 17-18 Feb. 2025

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5. Long-term stability

Time	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Begin	94.0	0.0	0.3	0.10	0.1
End	94.0				

6. Frequency and time weightings at 1 kHz

6.1 Frequency weightings at 1 kHz

Frequency Weighting	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
A-weight	94.0	0.0	0.2	0.20	0.2
C-weight	94.0	0.0	0.2	0.20	0.2
Flat	94.1	0.1	0.2	0.20	0.2

6.2 Time weightings at 1 kHz

Frequency Weighting	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Fast	94.0	0.0	0.1	0.20	0.2
Slow	94.0	0.0	0.1	0.20	0.2
Leq	94.0	0.0	0.1	0.20	0.2

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3. Acoustical signal test of frequency weightings

Frequency (Hz)	Deviation from frequency response (dB)			Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
	A-weight	C-weight	Flat			
125	0.4	0.3	0.2	1.5	0.45	0.6
1 000	-0.5	-0.5	-0.5	1.0	0.45	0.6
8 000	-4.0	-3.9	-4.0	5.0	0.45	0.7

4. Electrical signal test of frequency weightings

Frequency (Hz)	Deviation from frequency response (dB)			Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
	A-weight	C-weight	Flat			
63	-0.1	-0.2	-0.3	2.0	0.20	0.6
125	-0.1	-0.1	-0.2	1.5	0.20	0.6
250	0.0	-0.1	-0.1	1.5	0.20	0.6
500	0.0	0.0	0.0	1.5	0.20	0.6
1 000	0.0	0.0	0.0	1.0	0.20	0.6
2 000	0.0	0.1	0.1	2.0	0.20	0.6
4 000	0.1	0.1	0.1	3.0	0.20	0.6
8 000	0.1	0.1	0.1	5.0	0.20	0.7

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7. Level linearity on the reference level range

Anticipated value (dB)	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
120	120.0	0.0	1.1	0.30	0.3
119	119.0	0.0	1.1	0.30	0.3
114	114.0	0.0	1.1	0.30	0.3
109	109.0	0.0	1.1	0.30	0.3
104	104.0	0.0	1.1	0.30	0.3
99	99.0	0.0	1.1	0.30	0.3
94	94.0	0.0	1.1	0.30	0.3
89	89.0	0.0	1.1	0.30	0.3
84	84.0	0.0	1.1	0.30	0.3
79	79.0	0.0	1.1	0.30	0.3
74	74.0	0.0	1.1	0.30	0.3
69	69.0	0.0	1.1	0.30	0.3
64	64.0	0.0	1.1	0.30	0.3
59	59.0	0.0	1.1	0.30	0.3
54	54.0	0.0	1.1	0.30	0.3
49	49.0	0.0	1.1	0.30	0.3
44	44.0	0.0	1.1	0.30	0.3
43	43.0	0.0	1.1	0.30	0.3
42	42.1	0.1	1.1	0.30	0.3

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7. Level linearity on the reference level range

Anticipated value (dB)	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
41	41.1	0.1	1.1	0.30	0.3
40	40.1	0.1	1.1	0.30	0.3
39	39.1	0.1	1.1	0.30	0.3

8. Level linearity including the level range control

At reference sound level on the reference level range

Range	Anticipated value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
60-140	94.0	94.0	0.0	1.1	0.30	0.3
50-130	94.0	94.0	0.0	1.1	0.30	0.3
40-120	94.0	94.0	0.0	1.1	0.30	0.3
30-110	94.0	94.0	0.0	1.1	0.30	0.3
20-100	94.0	94.0	0.0	1.1	0.30	0.3

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10. Peak C sound level

Number of cycles in test signal	Anticipated value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Complete cycle	135.4	135.3	-0.1	3.0	0.20	0.35
Positive half cycle	134.4	134.2	-0.2	2.0	0.20	0.35
Negative half cycle	134.4	134.2	-0.2	2.0	0.20	0.35

11. Overload indication

Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Positive one-half cycle	Negative one-half cycle			
140.5	140.5	0.0	1.5	0.20

12. High-level stability

Time	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Begin	139.0	0.0	0.3	0.10	0.1
End	139.0				

Calibrated by: 
(Mr. Pannasit Phasingsri)

Approved by: 
(Mr. Pravee Khutap)

Electrical and Electronic Standards Laboratory
Industrial Metrology and Testing Service Centre

Date of Calibration : 17-18 Feb. 2025

Date of Issue : 24 Feb. 2025

Ref : 2011268011400185012

End of Certificate

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8. Level linearity including the level range control

At reference level at 5 dB greater than the under-range on a level range

Range	Anticipated value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
60-140	65	65.0	0.0	1.1	0.30	0.3
50-130	55	55.0	0.0	1.1	0.30	0.3
40-120	45	45.0	0.0	1.1	0.30	0.3
30-110	35	35.2	0.2	1.1	0.30	0.3
20-100	25	25.3	0.3	1.1	0.30	0.3

9. Tone burst response

Time Weighting	Toneburst Duration, Tb (ms)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Fast	200	115.8	-0.2	±1.0	0.20	0.3
	2	98.8	-0.2	+1.0; -2.5	0.20	0.3
	0.25	89.6	-0.4	+1.5; -5.0	0.20	0.3
Slow	200	109.4	-0.2	±1.0	0.20	0.3
	2	89.8	-0.2	+1.0; -5.0	0.20	0.3
	0.25	80.9	-0.1	+1.5; -5.0	0.20	0.3
SEL	200	109.9	-0.1	±1.0	0.20	0.3
	2	90.0	0.0	+1.0; -2.5	0.20	0.3
	0.25	80.9	-0.1	+1.5; -5.0	0.20	0.3

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CALIBRATION CERTIFICATE

Submitted by : Integrated Research Center Company Limited.

Address : 122 Moo 2, T.Thatoom, A.Srimahaphote, Prachinburi, 25140.

Calibrated at : Electrical and Electronic Standards Laboratory, Industrial Metrology and Testing Service Centre.
Soi 1C, Bangpoo Industrial Estate, Sukhumvit Rd., A.Muang, Samutprakan 10280.

Instrument Calibrated :

Description : Sound Level Meter
Manufacturer : Rion
Model : NL-42
Serial No. : 00433730
Microphone : Type UC-52 No.144953
Preamplifier : Type NH-24 No.33780

Ambient Environment

Temperature : (23 ± 3) °C
Relative Humidity : (50 ± 15) %
Ambient Pressure : (101.325 ± 1.5) kPa

Standards used :

- Band Pass Filter Stanford Research Systems SR 650 S/N 28712.
- Condenser Microphone Brüel&Kjaer 4180 S/N 2889871.
- Decade Attenuator Ando AL-205 S/N 00464602.
- Function/Arbitrary Waveform Generator Agilent 33220A S/N MY44042668.
- Digital Function Synthesizer NF Electronic Instruments DF-193A S/N 122037.
- Sound Calibrator Brüel&Kjaer 4231 S/N 3015154.
- Measuring Amplifier Brüel&Kjaer 2636 S/N 1537484.

Date of Receipt : 14 Jan. 2025

Date of Calibration : 17-18 Feb. 2025

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8. Power Amplifier Brüel&Kjær 2706 S/N 1517650.
9. Speaker Tannoy Limited, Great Britain Patent No. 215300.
10. Digital Multimeter Agilent 34401A S/N MY44005560.
11. Programmable Attenuator Tamagawa TPA-303A S/N 2212.

Calibration Procedure :

This instrument was calibrated by using calibration procedures no CP-102-02 and CP-102-03, which were based on IEC 61672-3 Electroacoustics - Sound Level Meters - Part 3 : Periodic tests (2013). These calibration procedures were related to the electrical and acoustic signal tests. The electrical signal test was carried out with the direct measurement method. The acoustic signal test was performed in an anechoic room with the comparison measurement method.

This instrument has been calibrated against standards maintained at the Electrical and Electronic Standards Laboratory (EEL), which are traceable to the International System of Units through the National Institute of Metrology (Thailand).

The information on actual reading is attached herewith and the uncertainty limits quoted refer to the measured values only.

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%.

Date of Calibration : 17-18 Feb. 2025

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3. Acoustical signal test of frequency weightings

Frequency (Hz)	Deviation from frequency response (dB)			Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
	A-weight	C-weight	Flat			
125	0.1	0.3	0.0	1.5	0.45	0.6
1 000	0.1	0.0	0.1	1.0	0.45	0.6
8 000	-4.6	-4.4	-4.7	5.0	0.45	0.7

4. Electrical signal test of frequency weightings

Frequency (Hz)	Deviation from frequency response (dB)			Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
	A-weight	C-weight	Flat			
63	0.0	0.0	0.1	2.0	0.20	0.6
125	0.0	0.1	0.1	1.5	0.20	0.6
250	0.0	0.1	0.1	1.5	0.20	0.6
500	0.0	0.0	0.0	1.5	0.20	0.6
1 000	0.0	0.0	0.0	1.0	0.20	0.6
2 000	0.0	0.1	0.1	2.0	0.20	0.6
4 000	0.0	0.1	0.1	3.0	0.20	0.6
8 000	0.1	0.1	0.1	5.0	0.20	0.7

Date of Calibration : 17-18 Feb. 2025

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1. Absolute Sensitivity

Reference Acoustic Signal (dB)	Measured value (dB)		Deviation value (dB)	Acceptance limit Class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
	Before adjust	After adjust				
93.95	93.8	113.9	20.0	1.0	0.30	N/A

Note: The external calibration adjustment was firstly performed. The internal calibration adjustment was then completed at the display of 124.0 dB.

2. Self-generated noise

2.1 Normal test

Measured value (dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
17.9	0.10	N/A

2.2 The microphone of the sound level meter was replaced by electrical signal input device

Frequency Weighting	Measured value (dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
A-Weight	14.3	0.70	N/A
C-Weight	19.4	0.70	N/A
Flat	25.1	0.30	N/A

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5. Long-term stability

Time	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Begin	94.0	0.0	0.3	0.10	0.1
End	94.0				

6. Frequency and time weightings at 1 kHz

6.1 Frequency weightings at 1 kHz

Frequency Weighting	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
A-weight	94.0	0.0	0.2	0.20	0.2
C-weight	94.0	0.0	0.2	0.20	0.2
Flat	94.1	0.1	0.2	0.20	0.2

6.2 Time weightings at 1 kHz

Frequency Weighting	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Fast	94.0	0.0	0.1	0.20	0.2
Slow	94.0	0.0	0.1	0.20	0.2
Leq	94.0	0.0	0.1	0.20	0.2

Date of Calibration : 17-18 Feb. 2025

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7. Level linearity on the reference level range

Anticipated value (dB)	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
137	137.1	0.1	1.1	0.64	0.3
136	136.1	0.1	1.1	0.69	0.3
135	135.0	0.0	1.1	0.58	0.3
133	133.0	0.0	1.1	0.64	0.3
132	132.0	0.0	1.1	0.64	0.3
131	131.0	0.0	1.1	0.64	0.3
130	130.0	0.0	1.1	0.64	0.3
129	129.0	0.0	1.1	2.90	0.3
124	124.0	0.0	1.1	2.90	0.3
119	119.0	0.0	1.1	2.90	0.3
114	114.0	0.0	1.1	2.90	0.3
109	109.0	0.0	1.1	2.90	0.3
104	104.0	0.0	1.1	2.90	0.3
99	99.0	0.0	1.1	0.30	0.3
94	94.0	0.0	1.1	0.30	0.3
89	89.0	0.0	1.1	0.30	0.3
84	84.1	0.1	1.1	0.30	0.3
79	79.0	0.0	1.1	0.30	0.3
74	74.0	0.0	1.1	0.30	0.3
69	69.0	0.0	1.1	0.30	0.3
64	64.0	0.0	1.1	0.30	0.3
59	58.9	-0.1	1.1	0.30	0.3

Date of Calibration : 17-18 Feb. 2025

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8. Level linearity including the level range control

At reference level at 5 dB greater than the under-range on a level range

Range	Anticipated value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
30-130	25	25.0	0.0	1.1	0.30	0.3

9. Tone burst response

Time Weighing	Toneburst Duration, Tb (ms)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Fast	200	126.0	0.0	±1.0	0.20	0.3
	2	108.9	-0.1	+1.0; -2.5	0.20	0.3
	0.25	100.0	0.0	+1.5; -5.0	0.20	0.3
Slow	200	119.5	-0.1	±1.0	0.20	0.3
	2	100.0	0.0	+1.0; -5.0	0.20	0.3

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7. Level linearity on the reference level range (cont.)

Anticipated value (dB)	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
54	53.9	-0.1	1.1	0.30	0.3
49	48.9	-0.1	1.1	0.30	0.3
44	44.0	0.0	1.1	0.30	0.3
39	38.9	-0.1	1.1	0.30	0.3
34	33.9	-0.1	1.1	0.30	0.3
29	29.0	0.0	1.1	0.30	0.3
28	27.9	-0.1	1.1	0.30	0.3
27	26.9	-0.1	1.1	0.30	0.3
26	25.9	-0.1	1.1	0.30	0.3
25	24.9	-0.1	1.1	0.30	0.3

8. Level linearity including the level range control

At reference sound level on the reference level range

Range	Anticipated value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
30-130	94.0	94.0	0.0	1.1	0.30	0.3

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10. Peak C sound level


Number of cycles in test signal	Anticipated value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Complete cycle	125.4	125.5	0.1	3.0	0.20	0.35
Positive half cycle	124.4	124.1	-0.3	2.0	0.20	0.35
Negative half cycle	124.4	124.1	-0.3	2.0	0.20	0.35

11. Overload indication

Measured value (dB)		Deviated	Acceptance limit	Uncertainty	Maximum-permitted uncertainty
Positive one-half cycle	Negative one-half cycle	value (dB)	class 2 (±dB)	(±dB)	of measurement (±dB)
135.4	135.4	0.0	1.5	0.55	0.25

12. High-level stability

Time	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Begin	129.0	0.0	0.3	0.10	0.1
End	129.0				

Calibrated by : 
(Mr. Pannasit Phasingri)

Approved by : 
(Mr. Pannasit Phasingri)

Date of Calibration : 17-18 Feb. 2025

Date of Issue : 24 Feb. 2025

End of Certificate

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CALIBRATION CERTIFICATE

Submitted by : Integrated Research Center Company Limited.

Address : 122 Moo 2, T.Thatoom, A.Srimahaphote, Prachinburi, 25140.

Calibrated at : Electrical and Electronic Standards Laboratory, Industrial Metrology and Testing Service Centre.
Soi 1C, Bangpoo Industrial Estate, Sukhumvit Rd., A.Muang, Samutprakan 10280.

Instrument Calibrated :

Description : Sound Level Meter
Manufacturer : Rion
Model : NL-42
Serial No. : 00646442
Microphone : Type UC-52 No.142301
Preamplifier : Type NH-24 No.22410

Ambient Environment

Temperature : (23 ± 3) °C
Relative Humidity : (50 ± 15) %
Ambient Pressure : (101.325 ± 1.5) kPa

Standards used :

1. Band Pass Filter Stanford Research Systems SR 650 S/N 28712.
2. Condenser Microphone Brüel&Kjær 4180 S/N 2889871.
3. Decade Attenuator Ando AL-205 S/N 00464602.
4. Function/Arbitrary Waveform Generator Agilent 33220A S/N MY44042668.
5. Digital Function Synthesizer NF Electronic Instruments DF-193A S/N 120377.
6. Sound Calibrator Brüel&Kjær 4231 S/N 3015154.
7. Measuring Amplifier Brüel&Kjær 2636 S/N 1537484.

Date of Receipt : 14 Jan. 2025

Date of Calibration : 17-18 Feb. 2025

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1. Absolute Sensitivity

Reference Acoustic Signal (dB)	Measured value (dB)		Deviation value (dB)	Acceptance limit Class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
	Before adjust	After adjust				
93.95	93.6	113.9	20.0	1.0	0.30	N/A

Note: The external calibration adjustment was firstly performed. The internal calibration adjustment was then completed at the display of 124.3 dB.

2. Self-generated noise

2.1 Normal test

Measured value (dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
16.9	0.10	N/A

2.2 The microphone of the sound level meter was replaced by electrical signal input device

Frequency Weighting	Measured value (dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
A-Weight	13.1	0.10	N/A
C-Weight	18.5	0.10	N/A
Flat	24.4	0.10	N/A

Date of Calibration : 17-18 Feb. 2025

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8. Power Amplifier Brüel&Kjær 2706 S/N 1517650.
9. Speaker Tannoy Limited, Great Britain British Patent No. 215300.
10. Digital Multimeter Agilent 34401A S/N MY44005560.
11. Programmable Attenuator Tamagawa TPA-303A S/N 2212.

Calibration Procedure :

This instrument was calibrated by using calibration procedures no CP-102-02 and CP-102-03, which were based on IEC 61672-3 Electroacoustics - Sound Level Meters - Part 3 : Periodic tests (2013). These calibration procedures were related to the electrical and acoustic signal tests. The electrical signal test was carried out with the direct measurement method. The acoustic signal test was performed in an anechoic room with the comparison measurement method.

This instrument has been calibrated against standards maintained at the Electrical and Electronic Standards Laboratory (EEL), which are traceable to the International System of Units through the National Institute of Metrology (Thailand).

The information on actual reading is attached herewith and the uncertainty limits quoted refer to the measured values only.

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%.

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3. Acoustical signal test of frequency weightings

Frequency (Hz)	Deviation from frequency response (dB)			Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
	A-weight	C-weight	Flat			
125	0.8	0.2	0.0	1.5	0.45	0.6
1 000	0.0	0.0	0.0	1.0	0.45	0.6
8 000	-2.0	-2.0	-2.1	5.0	0.45	0.7

4. Electrical signal test of frequency weightings

Frequency (Hz)	Deviation from frequency response (dB)			Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
	A-weight	C-weight	Flat			
63	-0.1	0.0	0.0	2.0	0.20	0.6
125	-0.1	0.0	0.0	1.5	0.20	0.6
250	0.0	0.0	0.0	1.5	0.20	0.6
500	0.0	0.0	0.0	1.5	0.20	0.6
1 000	0.0	0.0	0.0	1.0	0.20	0.6
2 000	0.0	0.0	0.0	2.0	0.20	0.6
4 000	0.0	0.0	0.0	3.0	0.20	0.6
8 000	0.0	0.0	0.0	5.0	0.20	0.7

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5. Long-term stability

Time	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Begin	94.0	0.0	0.3	0.10	0.1
End	94.0				

6. Frequency and time weightings at 1 kHz

6.1 Frequency weightings at 1 kHz

Frequency Weighting	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
A-weight	94.0	0.0	0.2	0.20	0.2
C-weight	94.0	0.0	0.2	0.20	0.2
Flat	94.1	0.1	0.2	0.20	0.2

6.2 Time weightings at 1 kHz

Frequency Weighting	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Fast	94.0	0.0	0.1	0.20	0.2
Slow	94.0	0.0	0.1	0.20	0.2
Lcq	94.0	0.0	0.1	0.20	0.2

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7. Level linearity on the reference level range (cont.)

Anticipated value (dB)	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
54	54.0	0.0	1.1	0.30	0.3
49	48.9	-0.1	1.1	0.30	0.3
44	43.9	-0.1	1.1	0.30	0.3
39	38.9	-0.1	1.1	0.30	0.3
34	34.0	0.0	1.1	0.30	0.3
29	28.9	-0.1	1.1	0.30	0.3
28	27.9	-0.1	1.1	0.30	0.3
27	26.9	-0.1	1.1	0.30	0.3
26	25.9	-0.1	1.1	0.30	0.3
25	24.9	-0.1	1.1	0.30	0.3

8. Level linearity including the level range control

At reference sound level on the reference level range

Range	Anticipated value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
30-130	94.0	94.0	0.0	1.1	0.30	0.3

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7. Level linearity on the reference level range

Anticipated value (dB)	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
137	136.6	-0.4	1.1	0.30	0.3
136	135.6	-0.4	1.1	0.30	0.3
135	134.7	-0.3	1.1	0.30	0.3
133	132.8	-0.2	1.1	0.30	0.3
132	131.8	-0.2	1.1	0.30	0.3
131	130.9	-0.1	1.1	0.30	0.3
130	129.9	-0.1	1.1	0.30	0.3
129	128.9	-0.1	1.1	0.30	0.3
124	124.0	0.0	1.1	0.30	0.3
119	119.0	0.0	1.1	0.30	0.3
114	114.0	0.0	1.1	0.30	0.3
109	109.0	0.0	1.1	0.30	0.3
104	104.0	0.0	1.1	0.30	0.3
99	99.0	0.0	1.1	0.30	0.3
94	94.0	0.0	1.1	0.30	0.3
89	89.0	0.0	1.1	0.30	0.3
84	84.0	0.0	1.1	0.30	0.3
79	78.9	-0.1	1.1	0.30	0.3
74	74.0	0.0	1.1	0.30	0.3
69	68.9	-0.1	1.1	0.30	0.3
64	64.0	0.0	1.1	0.30	0.3
59	58.9	-0.1	1.1	0.30	0.3

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8. Level linearity including the level range control

At reference level at 5 dB greater than the under-range on a level range

Range	Anticipated value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
30-130	25	25.0	0.0	1.1	0.30	0.3

9. Tone burst response

Time Weighting	Toneburst Duration, Tb (ms)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Fast	200	126.0	0.0	±1.0	0.20	0.3
	2	108.9	-0.1	+1.0; -2.5	0.20	0.3
	0.25	100.0	0.0	+1.5; -5.0	0.20	0.3
Slow	200	119.5	-0.1	±1.0	0.20	0.3
	2	100.0	0.0	+1.0; -5.0	0.20	0.3

Date of Calibration : 17-18 Feb. 2025

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10. Peak C sound level

Number of cycles in test signal	Anticipated value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Complete cycle	125.4	125.5	0.1	3.0	0.20	0.35
Positive half cycle	124.4	124.1	-0.3	2.0	0.20	0.35
Negative half cycle	124.4	124.1	-0.3	2.0	0.20	0.35

11. Overload indication

Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Positive one-half cycle	Negative one-half cycle			
135.4	135.4	0.0	1.5	0.55

12. High-level stability

Time	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Begin	129.0	0.0	0.3	0.10	0.1
End	129.0				

Calibrated by

(Mr. Pannasit Phasingrasi)

Approved by


 (Mr. Praveen Klauyapa)
 Director

 Electrical and Electronic Standards Laboratory
 Industrial Metrology and Testing Service Centre

Ref: 2011268011400185011

Date of Calibration : 17-18 Feb. 2025

Date of Issue : 24 Feb. 2025

End of Certificate

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- Power Amplifier Brüel&Kjær 2706 S/N 1517650.
- Speaker Tannoy Limited, Great Britain British Patent No. 215300.
- Digital Multimeter Agilent 34401A S/N MY44005560.
- Programmable Attenuator Tamagawa TPA-303A S/N 2212.

Calibration Procedure :

This instrument was calibrated by using calibration procedures no CP-102-02 and CP-102-03, which were based on IEC 61672-3 Electroacoustics - Sound Level Meters - Part 3 : Periodic tests (2013). These calibration procedures were related to the electrical and acoustic signal tests. The electrical signal test was carried out with the direct measurement method. The acoustic signal test was performed in an anechoic room with the comparison measurement method.

This instrument has been calibrated against standards maintained at the Electrical and Electronic Standards Laboratory (EEL), which are traceable to the International System of Units through the National Institute of Metrology (Thailand).

The information on actual reading is attached herewith and the uncertainty limits quoted refer to the measured values only.

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%.

Date of Calibration : 24-27 Feb. 2025

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CALIBRATION CERTIFICATE

Submitted by : Integrated Research Center Company Limited.

Address : 122 Moo 2, T.Thatoom, A.Srinahaphote, Prachinburi 25140.

Calibrated at : Electrical and Electronic Standards Laboratory, Industrial Metrology and Testing Service Centre.

Sri 1C, Bangpoo Industrial Estate, Sukhumvit Rd., A.Muang, Samutprakan 10280.

Instrument Calibrated :

Description : Sound Level Meter

Manufacturer : ACO

Model : 6236

Serial No. : 192014

Microphone : 7052NR No.73303

Preamplifier : -

Ambient Environment

Temperature : (23 ± 3) °C

Relative Humidity : (50 ± 15) %

Ambient Pressure : (101.325 ± 1.5) kPa

Standards used :

- Band Pass Filter Stanford Research Systems SR 650 S/N 28712.
- Condenser Microphone Brüel&Kjær 4180 S/N 2889871.
- Decade Attenuator Ando AL-205 S/N 00464602.
- Function/Arbitrary Waveform Generator Agilent 33220A S/N MY44042668.
- Digital Function Synthesizer NF Electronic Instruments DF-193A S/N 122037.
- Sound Calibrator Brüel&Kjær 4231 S/N 3015154.
- Measuring Amplifier Brüel&Kjær 2636 S/N 1537484.

Date of Receipt : 14 Jan. 2025

Date of Calibration : 24-27 Feb. 2025

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1. Absolute Sensitivity

Reference Acoustic Signal (dB)	Measured value (dB)	Deviation value (dB)	Acceptance limit Class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
93.99	94.0	0.0	1.0	0.48	N/A

Note: No adjustment.

2. Self-generated noise

2.1 Normal test

Measured value (dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
20.8	0.10	N/A

2.2 The microphone of the sound level meter was replaced by electrical signal input device

Frequency Weighting	Measured value (dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
A-Weight	13.3	0.10	N/A
C-Weight	18.4	0.10	N/A
Flat	22.4	0.10	N/A

Date of Calibration : 24-27 Feb. 2025

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3. Acoustical signal test of frequency weightings

Frequency (Hz)	Deviation from frequency response (dB)			Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
	A-weight	C-weight	Flat			
125	0.2	0.3	0.2	1.5	0.45	0.6
1 000	0.1	0.1	0.2	1.0	0.45	0.6
8 000	-1.6	-1.5	-1.1	5.0	0.45	0.7

4. Electrical signal test of frequency weightings

Frequency (Hz)	Deviation from frequency response (dB)			Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
	A-weight	C-weight	Flat			
63	0.0	0.0	-0.1	2.0	0.20	0.6
125	0.0	0.0	0.0	1.5	0.20	0.6
250	0.0	0.0	0.0	1.5	0.20	0.6
500	0.0	0.0	0.0	1.5	0.20	0.6
1 000	0.0	0.0	0.0	1.0	0.20	0.6
2 000	-0.1	-0.1	-0.1	2.0	0.20	0.6
4 000	-0.4	-0.4	-0.1	3.0	0.20	0.6
8 000	-0.6	-0.7	-0.2	5.0	0.20	0.7

Date of Calibration : 24-27 Feb.2025

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7. Level linearity on the reference level range

Anticipated value (dB)	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
122	122.0	0.0	1.1	0.30	0.3
121	121.1	0.1	1.1	0.30	0.3
120	120.1	0.1	1.1	0.30	0.3
119	119.1	0.1	1.1	0.30	0.3
114	114.0	0.0	1.1	0.30	0.3
109	109.0	0.0	1.1	0.30	0.3
104	104.0	0.0	1.1	0.30	0.3
99	99.0	0.0	1.1	0.30	0.3
94	94.0	0.0	1.1	0.30	0.3
89	89.0	0.0	1.1	0.30	0.3
84	84.0	0.0	1.1	0.30	0.3
79	79.1	0.1	1.1	0.30	0.3
74	74.1	0.1	1.1	0.30	0.3
69	69.1	0.1	1.1	0.30	0.3
64	64.0	0.0	1.1	0.30	0.3
59	59.0	0.0	1.1	0.30	0.3
54	54.0	0.0	1.1	0.30	0.3
49	49.0	0.0	1.1	0.30	0.3
44	44.0	0.0	1.1	0.30	0.3
39	39.0	0.0	1.1	0.30	0.3
34	34.1	0.1	1.1	0.30	0.3
33	33.1	0.1	1.1	0.30	0.3

Date of Calibration : 24-27 Feb.2025

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5. Long-term stability

Time	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Begin	94.0	0.0	0.3	0.10	0.1
End	94.0				

6. Frequency and time weightings at 1 kHz

6.1 Frequency weightings at 1 kHz

Frequency (Hz)	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Weighting					
A-weight	94.0	0.0	0.2	0.20	0.2
C-weight	94.0	0.0	0.2	0.20	0.2
Flat	94.1	0.1	0.2	0.20	0.2

6.2 Time weightings at 1 kHz

Frequency (Hz)	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Weighting					
Fast	94.0	0.0	0.1	0.20	0.2
Slow	94.0	0.0	0.1	0.20	0.2
Leq	94.0	0.0	0.1	0.20	0.2

Date of Calibration : 24-27 Feb.2025

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7. Level linearity on the reference level range

Anticipated value (dB)	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
32	32.2	0.2	1.1	0.30	0.3
31	31.2	0.2	1.1	0.30	0.3
30	30.3	0.3	1.1	0.30	0.3

8. Level linearity including the level range control

At reference sound level on the reference level range

Range	Anticipated value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
40-130	94.0	94.0	0.0	1.1	0.30	0.3
30-120	94.0	94.0	0.0	1.1	0.30	0.3
20-110	94.0	94.0	0.0	1.1	0.30	0.3
20-100	94.0	94.0	0.0	1.1	0.30	0.3

Date of Calibration : 24-27 Feb.2025

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THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-68/0160

MTC No. EEL. BP. 85/0168

8. Level linearity including the level range control

At reference level at 5 dB greater than the under-range on a level range

Range	Anticipated value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
40-130	45.0	45.0	0.0	1.1	0.30	0.3
30-120	35.0	35.0	0.0	1.1	0.30	0.3
20-110	25.0	25.3	0.3	1.1	0.30	0.3
20-100	25.0	25.2	0.2	1.1	0.30	0.3
20-90	25.0	25.2	0.2	1.1	0.30	0.3
20-80	25.0	25.2	0.2	1.1	0.30	0.3

9. Tone burst response

Time Weighting	Toneburst Duration, Tb (ms)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Fast	200	115.8	-0.2	±1.0	0.20	0.3
	2	98.3	-0.7	+1.0; -2.5	0.20	0.3
	0.25	89.2	-0.8	+1.5; -5.0	0.20	0.3
Slow	200	109.5	-0.1	±1.0	0.20	0.3
	2	89.7	-0.3	+1.0; -5.0	0.20	0.3
SEL	200	109.9	-0.1	±1.0	0.20	0.3
	2	89.9	-0.1	+1.0; -2.5	0.20	0.3
	0.25	80.9	-0.1	+1.5; -5.0	0.20	0.3

Date of Calibration : 24-27 Feb.2025

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THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-68/0160

MTC No. EEL. BP. 84/0168

CALIBRATION CERTIFICATE

Submitted by : Integrated Research Center Company Limited.

Address : 122 Moo 2, T.Thatoom, A.Srimahaphote, Prachinburi 25140.

Calibrated at : Electrical and Electronic Standards Laboratory, Industrial Metrology and Testing Service Centre.

Soi 1C, Bangpoo Industrial Estate, Sukhumvit Rd., A.Muang, Samutprakan 10280.

Instrument Calibrated :

Description : Sound Level Meter
Manufacturer : ACO
Model : 6236
Serial No. : 192015
Microphone : 7052NR No.73304
Preamplifier : -

Ambient Environment

Temperature : (23 ± 3) °C
Relative Humidity : (50 ± 15) %
Ambient Pressure : (101.325 ± 1.5) kPa

Standards used :

1. Band Pass Filter Stanford Research Systems SR 650 S/N 28712.
2. Condenser Microphone Brüel&Kjær 4180 S/N 2889871.
3. Decade Attenuator Ando AL-205 S/N 00464602.
4. Function/Arbitrary Waveform Generator Agilent 33220A S/N MY4402668.
5. Digital Function Synthesizer NF Electronic Instruments DF-193A S/N 122037.
6. Sound Calibrator Brüel&Kjær 4231 S/N 3015154.
7. Measuring Amplifier Brüel&Kjær 2636 S/N 1537484.

Date of Receipt : 14 Jan.2025

Date of Calibration : 24-27 Feb.2025

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Request No. 21-68/0160

MTC No. EEL. BP. 85/0168

10. Peak C sound level

Number of cycles in test signal	Anticipated value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Complete cycle	125.4	125.7	0.3	3.0	0.20	0.35
Positive half cycle	124.4	124.2	-0.2	2.0	0.20	0.35
Negative half cycle	124.4	124.2	-0.2	2.0	0.20	0.35

11. Overload indication

Measured value (dB)		Deviated	Acceptance limit	Uncertainty	Maximum-permitted uncertain
Positive one-half cycle	Negative one-half cycle	value (dB)	class 2 (±dB)	(±dB)	of measurement (±dB)
132.5	132.5	0.0	1.5	0.20	0.25

12. High-level stability

Time	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Begin	129.0	0.0	0.3	0.10	0.1
End	129.0				

Calibrated by :

Tawikiat Iamsanran
(Mr. Tawikiat Iamsanran)

Approved by :

Mr. Pranas Kiatpasa
Director
Electrical and Electronic Standards Laboratory
Industrial Metrology and Testing Service Centre

Date of Calibration : 24-27 Feb.2025

Date of Issue : 28 Feb.2025

Ref : 2011268011400185003

End of Certificate

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THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-68/0160

MTC No. EEL. BP. 84/0168

8. Power Amplifier Brüel&Kjær 2706 S/N 1517650.
9. Speaker Tannoy Limited, Great Britain British Patent No. 215300.
10. Digital Multimeter Agilent 34401A S/N MY44005560.
11. Programmable Attenuator Tamagawa TPA-303A S/N 2212.

Calibration Procedure :

This instrument was calibrated by using calibration procedures no CP-102-02 and CP-102-03, which were based on IEC 61672-3 Electroacoustics - Sound Level Meters - Part 3 : Periodic tests (2013). These calibration procedures were related to the electrical and acoustic signal tests. The electrical signal test was carried out with the direct measurement method. The acoustic signal test was performed in an anechoic room with the comparison measurement method.

This instrument has been calibrated against standards maintained at the Electrical and Electronic Standards Laboratory (EEL), which are traceable to the International System of Units through the National Institute of Metrology (Thailand).

The information on actual reading is attached herewith and the uncertainty limits quoted refer to the measured values only.

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%.

Date of Calibration : 24-27 Feb.2025

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1. Absolute Sensitivity

Reference Acoustic Signal (dB)	Measured value (dB)	Deviation value (dB)	Acceptance limit Class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
93.99	93.9	-0.1	1.0	0.48	N/A

Note: No adjustment.

2. Self-generated noise

2.1 Normal test

Measured value (dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
22.0	0.10	N/A

2.2 The microphone of the sound level meter was replaced by electrical signal input device

Frequency Weighting	Measured value (dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
A-Weight	15.7	0.10	N/A
C-Weight	21.5	0.10	N/A
Flat	26.0	0.10	N/A

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5. Long-term stability

Time	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Begin	94.0	0.0	0.3	0.10	0.1
End	94.0				

6. Frequency and time weightings at 1 kHz

6.1 Frequency weightings at 1 kHz

Frequency Weighting	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
A-weight	94.0	0.0	0.2	0.20	0.2
C-weight	94.0	0.0	0.2	0.20	0.2
Flat	94.0	0.0	0.2	0.20	0.2

6.2 Time weightings at 1 kHz

Frequency Weighting	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Fast	94.0	0.0	0.1	0.20	0.2
Slow	94.0	0.0	0.1	0.20	0.2
Leq	94.0	0.0	0.1	0.20	0.2

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3. Acoustical signal test of frequency weightings

Frequency (Hz)	Deviation from frequency response (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
125	A-weight 0.4 C-weight 0.4 Flat 0.4	1.5	0.45	0.6
1 000	-0.4 -0.4 -0.4	1.0	0.45	0.6
8 000	-0.8 -1.0 -0.6	5.0	0.45	0.7

4. Electrical signal test of frequency weightings

Frequency (Hz)	Deviation from frequency response (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
63	A-weight 0.1 C-weight 0.0 Flat -0.1	2.0	0.20	0.6
125	0.0 0.0 0.0	1.5	0.20	0.6
250	0.0 0.0 0.0	1.5	0.20	0.6
500	0.0 0.0 0.0	1.5	0.20	0.6
1 000	0.0 0.0 0.0	1.0	0.20	0.6
2 000	-0.1 0.0 -0.1	2.0	0.20	0.6
4 000	-0.4 -0.4 -0.1	3.0	0.20	0.6
8 000	-0.6 -0.6 -0.2	5.0	0.20	0.7

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7. Level linearity on the reference level range

Anticipated value (dB)	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
122	122.1	0.1	1.1	0.30	0.3
121	121.1	0.1	1.1	0.30	0.3
120	120.1	0.1	1.1	0.30	0.3
119	119.1	0.1	1.1	0.30	0.3
114	114.0	0.0	1.1	0.30	0.3
109	109.0	0.0	1.1	0.30	0.3
104	104.0	0.0	1.1	0.30	0.3
99	99.0	0.0	1.1	0.30	0.3
94	94.0	0.0	1.1	0.30	0.3
89	89.0	0.0	1.1	0.30	0.3
84	84.0	0.0	1.1	0.30	0.3
79	79.1	0.1	1.1	0.30	0.3
74	74.2	0.2	1.1	0.30	0.3
69	69.2	0.2	1.1	0.30	0.3
64	64.0	0.0	1.1	0.30	0.3
59	59.1	0.1	1.1	0.30	0.3
54	54.1	0.1	1.1	0.30	0.3
49	49.1	0.1	1.1	0.30	0.3
44	44.1	0.1	1.1	0.30	0.3
39	39.1	0.1	1.1	0.30	0.3
34	34.2	0.2	1.1	0.30	0.3
33	33.3	0.3	1.1	0.30	0.3

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Request No. 21-68/0160

MTC No. EEL. BP. 84/0168

7. Level linearity on the reference level range

Anticipated value (dB)	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
32	32.3	0.3	1.1	0.30	0.3
31	31.4	0.4	1.1	0.30	0.3
30	30.4	0.4	1.1	0.30	0.3

8. Level linearity including the level range control

At reference sound level on the reference level range

Range	Anticipated value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
40-130	94.0	94.0	0.0	1.1	0.30	0.3
30-120	94.0	94.0	0.0	1.1	0.30	0.3
20-110	94.0	94.0	0.0	1.1	0.30	0.3
20-100	94.0	94.0	0.0	1.1	0.30	0.3

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8. Level linearity including the level range control

At reference level at 5 dB greater than the under-range on a level range

Range	Anticipated value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
40-130	45.0	45.0	0.0	1.1	0.30	0.3
30-120	35.0	35.0	0.0	1.1	0.30	0.3
20-110	25.0	25.5	0.5	1.1	0.30	0.3
20-100	25.0	25.4	0.4	1.1	0.30	0.3
20-90	25.0	25.4	0.4	1.1	0.30	0.3
20-80	25.0	25.2	0.2	1.1	0.30	0.3

9. Tone burst response

Time Weighting	Toneburst Duration, Tb (ms)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Fast	200	115.8	-0.2	±1.0	0.20	0.3
	2	98.6	-0.4	+1.0; -2.5	0.20	0.3
	0.25	89.0	-1.0	+1.5; -5.0	0.20	0.3
Slow	200	109.4	-0.2	±1.0	0.20	0.3
	2	89.8	-0.2	+1.0; -5.0	0.20	0.3
SEL	200	109.9	-0.1	±1.0	0.20	0.3
	2	90.0	0.0	+1.0; -2.5	0.20	0.3
	0.25	80.9	-0.1	+1.5; -5.0	0.20	0.3

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10. Peak C sound level

Number of cycles in test signal	Anticipated value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Complete cycle	125.4	125.5	0.1	3.0	0.20	0.35
Positive half cycle	124.4	124.3	-0.1	2.0	0.20	0.35
Negative half cycle	124.4	124.3	-0.1	2.0	0.20	0.35

11. Overload indication

Measured value (dB)		Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Positive one-half cycle	Negative one-half cycle	value (dB)	class 2 (±dB)	(±dB)	of measurement (±dB)
132.5	132.5	0.0	1.5	0.20	0.25

12. High-level stability

Time	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Begin	129.0	0.0	0.3	0.10	0.1
End	129.0				

Calibrated by :

(Mr. Tawkiat Iamsanran)

Approved by :

(Mr. Pravit Kluayap)
Director

Electrical and Electronic Standards Laboratory
Industrial Metrology and Testing Service Centre

Date of Calibration : 24-27 Feb.2025

Date of Issue : 28 Feb.2025

Ref : 2011268011400185002

End of Certificate

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MTC No. EEL. BP. 83/0168

CALIBRATION CERTIFICATE

Submitted by : Integrated Research Center Company Limited.

Address : 122 Moo 2, T.Thatoom, A.Srimahaphote, Prachinburi 25140.

Calibrated at : Electrical and Electronic Standards Laboratory, Industrial Metrology and Testing Service Centre.
Soi 1C, Bangpoo Industrial Estate, Sukhumvit Rd., A.Muang, Samutprakan 10280.

Instrument Calibrated :

Description : Sound Level Meter

Manufacturer : ACO

Model : 6236

Serial No. : 192016

Microphone : 7052NR No.73305

Preamplifier : -

Standards used :

1. Band Pass Filter Stanford Research Systems SR 650 S/N 28712.
2. Condenser Microphone Brüel&Kjær 4180 S/N 2889871.
3. Decade Attenuator Ando AI-205 S/N 00464602.
4. Function/Arbitrary Waveform Generator Agilent 33220A S/N MY44042668.
5. Digital Function Synthesizer NF Electronic Instruments DF-193A S/N 122037.
6. Sound Calibrator Brüel&Kjær 4231 S/N 3015154.
7. Measuring Amplifier Brüel&Kjær 2636 S/N 1537484.

Ambient Environment

Temperature : (23 ± 3) °C

Relative Humidity : (50 ± 15) %

Ambient Pressure : (101.325 ± 1.5) kPa

Date of Receipt : 14 Jan.2025

Date of Calibration : 24-27 Feb.2025

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3. Acoustical signal test of frequency weightings

Frequency (Hz)	Deviation from frequency response (dB)			Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
	A-weight	C-weight	Flat			
125	0.5	0.6	0.5	1.5	0.45	0.6
1 000	-0.9	-0.9	-0.8	1.0	0.45	0.6
8 000	-1.3	-1.1	-0.7	5.0	0.45	0.7

4. Electrical signal test of frequency weightings

Frequency (Hz)	Deviation from frequency response (dB)			Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
	A-weight	C-weight	Flat			
63	0.1	0.0	-0.1	2.0	0.20	0.6
125	0.0	0.0	0.0	1.5	0.20	0.6
250	0.0	0.0	0.0	1.5	0.20	0.6
500	0.0	0.0	0.0	1.5	0.20	0.6
1 000	0.0	0.0	0.0	1.0	0.20	0.6
2 000	-0.1	-0.1	0.0	1.0	0.20	0.6
4 000	-0.4	-0.4	-0.1	3.0	0.20	0.6
8 000	-0.7	-0.6	-0.2	5.0	0.20	0.7

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FM.BLMTC.002 Rev.5

1. Absolute Sensitivity

Reference Acoustic Signal (dB)	Measured value (dB)	Deviation value (dB)	Acceptance limit Class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
93.99	93.3	-0.7	1.0	0.48	N/A

Note: No adjustment.

2. Self-generated noise**2.1 Normal test**

Measured value (dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
23.6	0.10	N/A

2.2 The microphone of the sound level meter was replaced by electrical signal input device

Frequency	Measured value (dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Weighting			
A-Weight	15.5	0.10	N/A
C-Weight	20.5	0.10	N/A
Flat	25.1	0.10	N/A

Date of Calibration : 24-27 Feb.2025

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5. Long-term stability

Time	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Begin	94.0	0.0	0.3	0.10	0.1
End	94.0				

6. Frequency and time weightings at 1 kHz**6.1 Frequency weightings at 1 kHz**

Frequency Weighting	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
A-weight	94.0	0.0	0.2	0.20	0.2
C-weight	94.0	0.0	0.2	0.20	0.2
Flat	94.1	0.1	0.2	0.20	0.2

6.2 Time weightings at 1 kHz

Frequency Weighting	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Fast	94.0	0.0	0.1	0.20	0.2
Slow	94.0	0.0	0.1	0.20	0.2
Leq	94.0	0.0	0.1	0.20	0.2

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7. Level linearity on the reference level range

Anticipated value (dB)	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
122	121.9	-0.1	1.1	0.30	0.3
121	120.9	-0.1	1.1	0.30	0.3
120	119.9	-0.1	1.1	0.30	0.3
119	118.9	-0.1	1.1	0.30	0.3
114	113.9	-0.1	1.1	0.30	0.3
109	109.0	0.0	1.1	0.30	0.3
104	104.0	0.0	1.1	0.30	0.3
99	99.0	0.0	1.1	0.30	0.3
94	94.0	0.0	1.1	0.30	0.3
89	89.0	0.0	1.1	0.30	0.3
84	84.1	0.1	1.1	0.30	0.3
79	79.1	0.1	1.1	0.30	0.3
74	74.1	0.1	1.1	0.30	0.3
69	69.2	0.2	1.1	0.30	0.3
64	64.0	0.0	1.1	0.30	0.3
59	59.1	0.1	1.1	0.30	0.3
54	54.0	0.0	1.1	0.30	0.3
49	49.1	0.1	1.1	0.30	0.3
44	44.1	0.1	1.1	0.30	0.3
39	39.1	0.1	1.1	0.30	0.3
34	34.2	0.2	1.1	0.30	0.3
33	33.3	0.3	1.1	0.30	0.3

Date of Calibration : 24-27 Feb.2025

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FMBLMTC.002 Rev.5

7. Level linearity on the reference level range

Anticipated value (dB)	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
32	32.4	0.4	1.1	0.30	0.3
31	31.5	0.5	1.1	0.30	0.3
30	30.6	0.6	1.1	0.30	0.3

8. Level linearity including the level range control

At reference sound level on the reference level range

Range	Anticipated value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
40-130	94.0	94.0	0.0	1.1	0.30	0.3
30-120	94.0	94.0	0.0	1.1	0.30	0.3
20-110	94.0	94.0	0.0	1.1	0.30	0.3
20-100	94.0	94.0	0.0	1.1	0.30	0.3

Date of Calibration : 24-27 Feb.2025

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8. Level linearity including the level range control

At reference level at 5 dB greater than the under-range on a level range

Range	Anticipated value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
40-130	45.0	44.9	-0.1	1.1	0.30	0.3
30-120	35.0	35.0	0.0	1.1	0.30	0.3
20-110	25.0	25.7	0.7	1.1	0.30	0.3
20-100	25.0	25.6	0.6	1.1	0.30	0.3
20-90	25.0	25.5	0.5	1.1	0.30	0.3
20-80	25.0	25.4	0.4	1.1	0.30	0.3

9. Tone burst response

Time Weighting	Toneburst Duration, Tb (ms)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Fast	200	116.0	0.0	±1.0	0.20	0.3
	2	98.6	-0.4	+1.0; -2.5	0.20	0.3
	0.25	89.5	-0.5	+1.5; -5.0	0.20	0.3
Slow	200	109.5	-0.1	±1.0	0.20	0.3
	2	89.8	-0.2	+1.0; -5.0	0.20	0.3
SEL	200	109.9	-0.1	±1.0	0.20	0.3
	2	89.9	-0.1	+1.0; -2.5	0.20	0.3
	0.25	80.9	-0.1	+1.5; -5.0	0.20	0.3

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10. Peak C sound level

Number of cycles in test signal	Anticipated value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Complete cycle	125.4	125.1	-0.3	3.0	0.20	0.35
Positive half cycle	124.4	122.4	-2.0	2.0	0.20	0.35
Negative half cycle	124.4	124.6	0.2	2.0	0.20	0.35

11. Overload indication

Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Positive one-half cycle	Negative one-half cycle	0.0	1.5	0.20
132.5	132.5			0.25

12. High-level stability

Time	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Begin	129.0	0.0	0.3	0.10	0.1
End	129.0				

Calibrated by :

(Mr. Tawikiat Iamsamran)

Approved by :

(Mr. Prawee Kiatyapa)
Director

Electrical and Electronic Standards Laboratory

Industrial Metrology and Testing Service Centre

Date of Calibration : 24-27 Feb.2025

Date of Issue : 28 Feb.2025

Ref : 201126801400185001

End of Certificate

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FMBLMTC.002 Rev.5

CALIBRATION CERTIFICATE

Submitted by : Integrated Research Center Company Limited.

Address : 122 Moo 2, T.Thatoom, A.Srinahaphote, Prachinburi 25140.

Calibrated at : Electrical and Electronic Standards Laboratory, Industrial Metrology and Testing Service Centre.

Soi 1C, Bangpoo Industrial Estate, Sukhumvit Rd., A.Muang, Samutprakan 10280.

Instrument Calibrated :

Description : Sound Level Meter

Manufacturer : ACO

Model : 6236

Serial No. : 212014

Microphone : 7052NR No.76235

Preamplifier : -

Ambient Environment

Temperature : $(23 \pm 3) ^\circ\text{C}$ Relative Humidity : $(50 \pm 15) \%$ Ambient Pressure : $(101.325 \pm 1.5) \text{ kPa}$

Standards used :

1. Band Pass Filter Stanford Research Systems SR 650 S/N 28712.
2. Condenser Microphone Brüel&Kjær 4180 S/N 2889871.
3. Decade Attenuator Ando AL-205 S/N 00464602.
4. Function/Arbitrary Waveform Generator Agilent 33220A S/N MY44042668.
5. Digital Function Synthesizer NF Electronic Instruments DF-193A S/N 122037.
6. Sound Calibrator Brüel&Kjær 4231 S/N 3015154.
7. Measuring Amplifier Brüel&Kjær 2636 S/N 1537484.

Date of Receipt : 14 Jan.2025

Date of Calibration : 24-27 Feb.2025

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1. Absolute Sensitivity

Reference Acoustic Signal (dB)	Measured value (dB)		Deviation value (dB)	Acceptance limit Class 2 (\pm dB)	Uncertainty (\pm dB)	Maximum-permitted uncertainty of measurement (\pm dB)
	Before adjust	After adjust				
93.99	94.2	94.0	0.0	1.0	0.48	N/A

Note: The external calibration adjustment was firstly performed. The internal calibration adjustment was then completed at the display of 114.7 dB.

2. Self-generated noise

2.1 Normal test

Measured value (dB)	Uncertainty (\pm dB)	Maximum-permitted uncertainty of measurement (\pm dB)
20.7	0.10	N/A

2.2 The microphone of the sound level meter was replaced by electrical signal input device

Frequency Weighting	Measured value (dB)	Uncertainty (\pm dB)	Maximum-permitted uncertainty of measurement (\pm dB)
A-Weight	13.7	0.10	N/A
C-Weight	19.0	0.10	N/A
Flat	23.9	0.10	N/A

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8. Power Amplifier Brüel&Kjær 2706 S/N 1517650.

9. Speaker Tannoy Limited, Great Britain British Patent No. 215300.

10. Digital Multimeter Agilent 34401A S/N MY44005560.

11. Programmable Attenuator Tamagawa TPA-303A S/N 2212.

Calibration Procedure :

This instrument was calibrated by using calibration procedures no CP-102-02 and CP-102-03, which were based on IEC 61672-3 Electroacoustics - Sound Level Meters - Part 3 : Periodic tests (2013). These calibration procedures were related to the electrical and acoustic signal tests. The electrical signal test was carried out with the direct measurement method. The acoustic signal test was performed in an anechoic room with the comparison measurement method.

This instrument has been calibrated against standards maintained at the Electrical and Electronic Standards Laboratory (EEL), which are traceable to the International System of Units through the National Institute of Metrology (Thailand).

The information on actual reading is attached herewith and the uncertainty limits quoted refer to the measured values only.

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%.

Date of Calibration : 24-27 Feb.2025

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3. Acoustical signal test of frequency weightings

Frequency (Hz)	Deviation from frequency response (dB)			Acceptance limit class 2 (\pm dB)	Uncertainty (\pm dB)	Maximum-permitted uncertainty of measurement (\pm dB)
	A-weight	C-weight	Flat			
125	0.5	0.5	0.3	1.5	0.45	0.6
1 000	-0.1	-0.2	0.0	1.0	0.45	0.6
8 000	-1.3	-1.1	-0.8	5.0	0.45	0.7

4. Electrical signal test of frequency weightings

Frequency (Hz)	Deviation from frequency response (dB)			Acceptance limit class 2 (\pm dB)	Uncertainty (\pm dB)	Maximum-permitted uncertainty of measurement (\pm dB)
	A-weight	C-weight	Flat			
63	0.2	0.0	-0.1	2.0	0.20	0.6
125	0.1	0.0	0.0	1.5	0.20	0.6
250	0.1	0.0	0.0	1.5	0.20	0.6
500	0.0	0.0	0.0	1.5	0.20	0.6
1 000	0.0	0.0	0.0	1.0	0.20	0.6
2 000	-0.1	0.0	-0.1	2.0	0.20	0.6
4 000	-0.4	-0.3	-0.1	3.0	0.20	0.6
8 000	-0.6	-0.6	-0.2	5.0	0.20	0.7

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THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-68/0160

MTC No. EEL. BP. 86/0168

5. Long-term stability

Time	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Begin	94.0	0.0	0.3	0.10	0.1
End	94.0				

6. Frequency and time weightings at 1 kHz

6.1 Frequency weightings at 1 kHz

Frequency Weighting	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
A-weight	94.0	0.0	0.2	0.20	0.2
C-weight	94.0	0.0	0.2	0.20	0.2
Flat	94.0	0.0	0.2	0.20	0.2

6.2 Time weightings at 1 kHz

Frequency Weighting	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Fast	94.0	0.0	0.1	0.20	0.2
Slow	94.0	0.0	0.1	0.20	0.2
Leq	94.0	0.0	0.1	0.20	0.2

Date of Calibration : 24-27 Feb.2025

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Request No. 21-68/0160

MTC No. EEL. BP. 86/0168

7. Level linearity on the reference level range

Anticipated value (dB)	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
32	32.2	0.2	1.1	0.30	0.3
31	31.3	0.3	1.1	0.30	0.3
30	30.3	0.3	1.1	0.30	0.3

8. Level linearity including the level range control

At reference sound level on the reference level range

Range	Anticipated value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
40-130	94.0	94.0	0.0	1.1	0.30	0.3
30-120	94.0	94.0	0.0	1.1	0.30	0.3
20-110	94.0	94.0	0.0	1.1	0.30	0.3
20-100	94.0	94.0	0.0	1.1	0.30	0.3

Date of Calibration : 24-27 Feb.2025

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THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-68/0160

MTC No. EEL. BP. 86/0168

7. Level linearity on the reference level range

Anticipated value (dB)	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
122	122.1	0.1	1.1	0.30	0.3
121	121.1	0.1	1.1	0.30	0.3
120	120.1	0.1	1.1	0.30	0.3
119	119.1	0.1	1.1	0.30	0.3
114	114.0	0.0	1.1	0.30	0.3
109	109.0	0.0	1.1	0.30	0.3
104	104.0	0.0	1.1	0.30	0.3
99	99.0	0.0	1.1	0.30	0.3
94	94.0	0.0	1.1	0.30	0.3
89	89.0	0.0	1.1	0.30	0.3
84	84.0	0.0	1.1	0.30	0.3
79	79.0	0.0	1.1	0.30	0.3
74	74.1	0.1	1.1	0.30	0.3
69	69.1	0.1	1.1	0.30	0.3
64	64.0	0.0	1.1	0.30	0.3
59	59.0	0.0	1.1	0.30	0.3
54	54.0	0.0	1.1	0.30	0.3
49	49.0	0.0	1.1	0.30	0.3
44	44.0	0.0	1.1	0.30	0.3
39	39.0	0.0	1.1	0.30	0.3
34	34.1	0.1	1.1	0.30	0.3
33	33.2	0.2	1.1	0.30	0.3

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THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-68/0160

MTC No. EEL. BP. 86/0168

8. Level linearity including the level range control

At reference level at 5 dB greater than the under-range on a level range

Range	Anticipated value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
40-130	45.0	45.0	0.0	1.1	0.30	0.3
30-120	35.0	35.0	0.0	1.1	0.30	0.3
20-110	25.0	25.3	0.3	1.1	0.30	0.3
20-100	25.0	25.3	0.3	1.1	0.30	0.3
20-90	25.0	25.2	0.2	1.1	0.30	0.3
20-80	25.0	25.2	0.2	1.1	0.30	0.3

9. Tone burst response

Time Weighting	Toneburst Duration, Tb (ms)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Fast	200	115.8	-0.2	±1.0	0.20	0.3
	2	98.7	-0.3	+1.0; -2.5	0.20	0.3
	0.25	89.2	-0.8	+1.5; -5.0	0.20	0.3
Slow	200	109.5	-0.1	±1.0	0.20	0.3
	2	89.8	-0.2	+1.0; -5.0	0.20	0.3
SEL	200	109.9	-0.1	±1.0	0.20	0.3
	2	89.9	-0.1	+1.0; -2.5	0.20	0.3
	0.25	80.9	-0.1	+1.5; -5.0	0.20	0.3

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THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-68/0160

MTC No. EEL. BP. 86/0168

10. Peak C sound level

Number of cycles in test signal	Anticipated value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Complete cycle	125.4	125.0	-0.4	3.0	0.20	0.35
Positive half cycle	124.4	124.3	-0.1	2.0	0.20	0.35
Negative half cycle	124.4	124.3	-0.1	2.0	0.20	0.35

11. Overload indication

Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Positive one-half cycle	Negative one-half cycle			
132.5	132.5	0.0	1.5	0.20

12. High-level stability

Time	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Begin	129.0	0.0	0.3	0.10	0.1
End	129.0				

Calibrated by :

(Mr. Tawikiat Tamsamran)

Approved by :



(Mr. Pawane Khuyap)

Director

Electrical and Electronic Standards Laboratory
Industrial Metrology and Testing Service Centre

Date of Calibration : 24-27 Feb.2025

Date of Issue : 28 Feb.2025

Ref : 2011268011400185004

End of Certificate

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THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-68/0160

MTC No. EEL. BP. 87/0168

CALIBRATION CERTIFICATE

Submitted by : Integrated Research Center Company Limited.

Address : 122 Moo 2, T.Thatoom, A.Srimahaphote, Prachinburi 25140.

Calibrated at : Electrical and Electronic Standards Laboratory, Industrial Metrology and Testing Service Centre.

Soi 1C, Bangpoo Industrial Estate, Sukhumvit Rd., A.Muang, Samutprakan 10280.

Instrument Calibrated :

Description : Sound Level Meter

Manufacturer : ACO

Model : 6236

Serial No. : 212015

Microphone : 7052NR No.76236

Preamplifier : -

Ambient Environment

Temperature : (23 ± 3) °C

Relative Humidity : (50 ± 15) %

Ambient Pressure : (101.325±1.5) kPa

Standards used :

1. Band Pass Filter Stanford Research Systems SR 650 S/N 28712.
2. Condenser Microphone Brüel&Kjær 4180 S/N 2889871.
3. Decade Attenuator Ando AL-205 S/N 00464602.
4. Function/Arbitrary Waveform Generator Agilent 33220A S/N MY44042668.
5. Digital Function Synthesizer NF Electronic Instruments DF-193A S/N 122037.
6. Sound Calibrator Brüel&Kjær 4231 S/N 3015154.
7. Measuring Amplifier Brüel&Kjær 2636 S/N 1537484.

Date of Receipt : 14 Jan.2025

Date of Calibration : 24-27 Feb.2025

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THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-68/0160

MTC No. EEL. BP. 87/0168

8. Power Amplifier Brüel&Kjær 2706 S/N 1517650.
9. Speaker Tannoy Limited, Great Britain British Patent No. 215300.
10. Digital Multimeter Agilent 34401A S/N MY44005560.
11. Programmable Attenuator Tamagawa TPA-303A S/N 2212.

Calibration Procedure :

This instrument was calibrated by using calibration procedures no CP-102-02 and CP-102-03, which were based on IEC 61672-3 Electroacoustics - Sound Level Meters - Part 3 : Periodic tests (2013). These calibration procedures were related to the electrical and acoustic signal tests. The electrical signal test was carried out with the direct measurement method. The acoustic signal test was performed in an anechoic room with the comparison measurement method.

This instrument has been calibrated against standards maintained at the Electrical and Electronic Standards Laboratory (EEL), which are traceable to the International System of Units through the National Institute of Metrology (Thailand).

The information on actual reading is attached herewith and the uncertainty limits quoted refer to the measured values only.

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%.

Date of Calibration : 24-27 Feb.2025

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THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-68/0160

MTC No. EEL. BP. 87/0168

1. Absolute Sensitivity

Reference Acoustic Signal (dB)	Measured value (dB)	Deviation value (dB)	Acceptance limit Class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
	Before adjust	After adjust			
93.99	94.4	94.0	0.0	1.0	0.48

Note: The external calibration adjustment was firstly performed. The internal calibration adjustment was then completed at the display of 115.0 dB.

2. Self-generated noise

2.1 Normal test

Measured value (dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
20.7	0.10	N/A

2.2 The microphone of the sound level meter was replaced by electrical signal input device

Frequency	Measured value (dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Weighting			
A-Weight	15.1	0.10	N/A
C-Weight	19.9	0.10	N/A
Flat	24.7	0.10	N/A

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3. Acoustical signal test of frequency weightings

Frequency (Hz)	Deviation from frequency response (dB)			Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
	A-weight	C-weight	Flat			
125	0.4	0.6	0.4	1.5	0.45	0.6
1 000	-0.1	-0.1	0.1	1.0	0.45	0.6
8 000	-0.7	-0.7	-0.2	5.0	0.45	0.7

4. Electrical signal test of frequency weightings

Frequency (Hz)	Deviation from frequency response (dB)			Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
	A-weight	C-weight	Flat			
63	0.0	0.0	-0.1	2.0	0.20	0.6
125	-0.1	0.0	0.0	1.5	0.20	0.6
250	0.0	0.0	0.0	1.5	0.20	0.6
500	0.0	0.0	0.0	1.5	0.20	0.6
1 000	0.0	0.0	0.0	1.0	0.20	0.6
2 000	-0.1	-0.1	-0.1	2.0	0.20	0.6
4 000	-0.4	-0.4	-0.1	3.0	0.20	0.6
8 000	-0.6	-0.6	-0.2	5.0	0.20	0.7

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5. Long-term stability

Time	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Begin	94.0	0.0	0.3	0.10	0.1
End	94.0				

6. Frequency and time weightings at 1 kHz

6.1 Frequency weightings at 1 kHz

Frequency Weighting	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
A-weight	94.0	0.0	0.2	0.20	0.2
C-weight	94.0	0.0	0.2	0.20	0.2
Flat	94.0	0.0	0.2	0.20	0.2

6.2 Time weightings at 1 kHz

Frequency Weighting	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Fast	94.0	0.0	0.1	0.20	0.2
Slow	94.0	0.0	0.1	0.20	0.2
Leq	94.0	0.0	0.1	0.20	0.2

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7. Level linearity on the reference level range

Anticipated value (dB)	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
122	122.0	0.0	1.1	0.30	0.3
121	121.0	0.0	1.1	0.30	0.3
120	120.0	0.0	1.1	0.30	0.3
119	119.0	0.0	1.1	0.30	0.3
114	114.0	0.0	1.1	0.30	0.3
109	109.0	0.0	1.1	0.30	0.3
104	104.0	0.0	1.1	0.30	0.3
99	99.0	0.0	1.1	0.30	0.3
94	94.0	0.0	1.1	0.30	0.3
89	89.0	0.0	1.1	0.30	0.3
84	84.1	0.1	1.1	0.30	0.3
79	79.1	0.1	1.1	0.30	0.3
74	74.1	0.1	1.1	0.30	0.3
69	69.1	0.1	1.1	0.30	0.3
64	64.0	0.0	1.1	0.30	0.3
59	59.0	0.0	1.1	0.30	0.3
54	54.0	0.0	1.1	0.30	0.3
49	49.0	0.0	1.1	0.30	0.3
44	44.0	0.0	1.1	0.30	0.3
39	39.0	0.0	1.1	0.30	0.3
34	34.1	0.1	1.1	0.30	0.3
33	33.1	0.1	1.1	0.30	0.3

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7. Level linearity on the reference level range

Anticipated value (dB)	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
32	32.2	0.2	1.1	0.30	0.3
31	31.2	0.2	1.1	0.30	0.3
30	30.3	0.3	1.1	0.30	0.3

8. Level linearity including the level range control

At reference sound level on the reference level range

Range	Anticipated value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
40-130	94.0	94.0	0.0	1.1	0.30	0.3
30-120	94.0	94.0	0.0	1.1	0.30	0.3
20-110	94.0	94.0	0.0	1.1	0.30	0.3
20-100	94.0	94.0	0.0	1.1	0.30	0.3

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8. Level linearity including the level range control

At reference level at 5 dB greater than the under-range on a level range

Range	Anticipated value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
40-130	45.0	45.0	0.0	1.1	0.30	0.3
30-120	35.0	35.0	0.0	1.1	0.30	0.3
20-110	25.0	25.3	0.3	1.1	0.30	0.3
20-100	25.0	25.2	0.2	1.1	0.30	0.3
20-90	25.0	25.1	0.1	1.1	0.30	0.3
20-80	25.0	24.9	-0.1	1.1	0.30	0.3

9. Tone burst response

Time Weighing	Toneburst Duration, T _b (ms)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Fast	200	115.8	-0.2	±1.0	0.20	0.3
	2	98.9	-0.1	+1.0; -2.5	0.20	0.3
	0.25	89.0	-1.0	+1.5; -5.0	0.20	0.3
Slow	200	109.3	-0.3	±1.0	0.20	0.3
	2	89.8	-0.2	+1.0; -5.0	0.20	0.3
SEL	200	109.9	-0.1	±1.0	0.20	0.3
	2	89.9	-0.1	+1.0; -2.5	0.20	0.3
	0.25	80.9	-0.1	+1.5; -5.0	0.20	0.3

Date of Calibration : 24-27 Feb.2025

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(66) 08 1889 6827

CALIBRATION CERTIFICATE

Submitted by : Integrated Research Center Company Limited.

Address : 122 Moo 2, T.Thatoom, A.Srimahaphote, Prachinburi 25140.

Calibrated at : Electrical and Electronic Standards Laboratory, Industrial Metrology and Testing Service Centre.
Soi IC, Bangpoo Industrial Estate, Sukhumvit Rd., A.Muang, Samutprakan 10280.

Instrument Calibrated :

Description : Sound Level Meter
Manufacturer : ACO
Model : 6236
Serial No. : 212016
Microphone : 7052NR No.76237
Preamplifier : -

Ambient Environment

Temperature : (23 ± 3) °C
Relative Humidity : (50 ± 15) %
Ambient Pressure : (101.325 ± 1.5) kPa

Standards used :

1. Band Pass Filter Stanford Research Systems SR 650 S/N 28712.
2. Condenser Microphone Brüel&Kjær 4180 S/N 2889871.
3. Decade Attenuator Ando AL-205 S/N 00464602.
4. Function/Arbitrary Waveform Generator Agilent 33220A S/N MY44042668.
5. Digital Function Synthesizer NF Electronic Instruments DF-193A S/N 122037.
6. Sound Calibrator Brüel&Kjær 4231 S/N 3015154.
7. Measuring Amplifier Brüel&Kjær 2636 S/N 1537484.

Date of Receipt : 14 Jan.2025

Date of Calibration : 24-27 Feb.2025

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10. Peak C sound level

Number of cycles in test signal	Anticipated value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Complete cycle	125.4	125.5	0.1	3.0	0.20	0.35
Positive half cycle	124.4	124.3	-0.1	2.0	0.20	0.35
Negative half cycle	124.4	124.3	-0.1	2.0	0.20	0.35

11. Overload indication

Measured value (dB)		Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Positive one-half cycle	Negative one-half cycle				
132.5	132.5	0.0	1.5	0.20	0.25

12. High-level stability

Time	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Begin	129.0	0.0	0.3	0.10	0.1
End	129.0				

Calibrated by :

(Mr. Tawikiat Jamsamran)

Approved by :

(Mr. Prasade Klaiyaya)
Director

Electrical and Electronic Standards Laboratory

Industrial Metrology and Testing Service Centre

Date of Calibration : 24-27 Feb.2025

Date of Issue : 28 Feb.2025

Ref : 2011268011400185005

End of Certificate

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8. Power Amplifier Brüel&Kjær 2706 S/N 1517650.
9. Speaker Tannoy Limited, Great Britain British Patent No. 215300.
10. Digital Multimeter Agilent 34401A S/N MY44005560.
11. Programmable Attenuator Tamagawa TPA-303A S/N 2212.

Calibration Procedure :

This instrument was calibrated by using calibration procedures no CP-102-02 and CP-102-03, which were based on IEC 61672-3 Electroacoustics - Sound Level Meters - Part 3 : Periodic tests (2013). These calibration procedures were related to the electrical and acoustic signal tests. The electrical signal test was carried out with the direct measurement method. The acoustic signal test was performed in an anechoic room with the comparison measurement method.

This instrument has been calibrated against standards maintained at the Electrical and Electronic Standards Laboratory (EEL), which are traceable to the International System of Units through the National Institute of Metrology (Thailand).

The information on actual reading is attached herewith and the uncertainty limits quoted refer to the measured values only.

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%.

Date of Calibration : 24-27 Feb.2025

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1. Absolute Sensitivity

Reference Acoustic Signal (dB)	Measured value (dB)	Deviation value (dB)	Acceptance limit Class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
93.99	94.0	0.0	1.0	0.48	N/A

Note: No adjustment.

2. Self-generated noise

2.1 Normal test

Measured value (dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
21.3	0.10	N/A

2.2 The microphone of the sound level meter was replaced by electrical signal input device

Frequency Weighting	Measured value (dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
A-Weight	14.4	0.10	N/A
C-Weight	19.1	0.10	N/A
Flat	23.5	0.10	N/A

Date of Calibration : 24-27 Feb.2025

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3. Acoustical signal test of frequency weightings

Frequency (Hz)	Deviation from frequency response (dB)			Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
	A-weight	C-weight	Flat			
125	0.5	0.5	0.4	1.5	0.45	0.6
1 000	-0.1	-0.1	0.0	1.0	0.45	0.6
8 000	-1.5	-1.7	-1.1	5.0	0.45	0.7

4. Electrical signal test of frequency weightings

Frequency (Hz)	Deviation from frequency response (dB)			Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
	A-weight	C-weight	Flat			
63	0.1	0.0	-0.1	2.0	0.20	0.6
125	0.0	0.0	0.0	1.5	0.20	0.6
250	0.0	0.0	0.0	1.5	0.20	0.6
500	0.0	0.0	0.0	1.5	0.20	0.6
1 000	0.0	0.0	0.0	1.0	0.20	0.6
2 000	-0.1	0.0	-0.1	2.0	0.20	0.6
4 000	-0.4	-0.3	-0.1	3.0	0.20	0.6
8 000	-0.6	-0.6	-0.2	5.0	0.20	0.7

Date of Calibration : 24-27 Feb.2025

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5. Long-term stability

Time	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Begin	94.0	0.0	0.3	0.10	0.1
End	94.0				

6. Frequency and time weightings at 1 kHz

6.1 Frequency weightings at 1 kHz

Frequency Weighting	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
A-weight	94.0	0.0	0.2	0.20	0.2
C-weight	94.0	0.0	0.2	0.20	0.2
Flat	94.0	0.0	0.2	0.20	0.2

6.2 Time weightings at 1 kHz

Frequency Weighting	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Fast	94.0	0.0	0.1	0.20	0.2
Slow	94.0	0.0	0.1	0.20	0.2
Leq	94.0	0.0	0.1	0.20	0.2

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7. Level linearity on the reference level range

Anticipated value (dB)	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
122	122.1	0.1	1.1	0.30	0.3
121	121.1	0.1	1.1	0.30	0.3
120	120.1	0.1	1.1	0.30	0.3
119	119.1	0.1	1.1	0.30	0.3
114	114.0	0.0	1.1	0.30	0.3
109	109.0	0.0	1.1	0.30	0.3
104	104.0	0.0	1.1	0.30	0.3
99	99.0	0.0	1.1	0.30	0.3
94	94.0	0.0	1.1	0.30	0.3
89	89.0	0.0	1.1	0.30	0.3
84	83.9	-0.1	1.1	0.30	0.3
79	78.9	-0.1	1.1	0.30	0.3
74	74.1	0.1	1.1	0.30	0.3
69	69.2	0.2	1.1	0.30	0.3
64	64.0	0.0	1.1	0.30	0.3
59	59.0	0.0	1.1	0.30	0.3
54	54.0	0.0	1.1	0.30	0.3
49	49.1	0.1	1.1	0.30	0.3
44	44.1	0.1	1.1	0.30	0.3
39	39.0	0.0	1.1	0.30	0.3
34	34.2	0.2	1.1	0.30	0.3
33	33.2	0.2	1.1	0.30	0.3

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7. Level linearity on the reference level range

Anticipated value (dB)	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
32	32.2	0.2	1.1	0.30	0.3
31	31.2	0.2	1.1	0.30	0.3
30	30.3	0.3	1.1	0.30	0.3

8. Level linearity including the level range control

At reference sound level on the reference level range

Range	Anticipated value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
40-130	94.0	94.0	0.0	1.1	0.30	0.3
30-120	94.0	94.0	0.0	1.1	0.30	0.3
20-110	94.0	94.0	0.0	1.1	0.30	0.3
20-100	94.0	94.0	0.0	1.1	0.30	0.3

Date of Calibration : 24-27 Feb.2025

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10. Peak C sound level

Number of cycles in test signal	Anticipated value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Complete cycle	125.4	125.3	-0.1	3.0	0.20	0.35
Positive half cycle	124.4	124.3	-0.1	2.0	0.20	0.35
Negative half cycle	124.4	124.2	-0.2	2.0	0.20	0.35

11. Overload indication

Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Positive one-half cycle	Negative one-half cycle			
132.5	132.5	0.0	1.5	0.20

12. High-level stability

Time	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Begin	129.0	0.0	0.3	0.10	0.1
End	129.0				

Calibrated by :

(Mr. Tawikiat Iamsanran)

Approved by :



Electrical and Electronic Standards Laboratory
Industrial Metrology and Testing Service Centre

Date of Calibration : 24-27 Feb.2025

Date of Issue : 28 Feb.2025

Ref : 2011268011400185006

End of Certificate

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8. Level linearity including the level range control

At reference level at 5 dB greater than the under-range on a level range

Range	Anticipated value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
40-130	45.0	45.0	0.0	1.1	0.30	0.3
30-120	35.0	35.0	0.0	1.1	0.30	0.3
20-110	25.0	25.5	0.5	1.1	0.30	0.3
20-100	25.0	25.4	0.4	1.1	0.30	0.3
20-90	25.0	25.3	0.3	1.1	0.30	0.3
20-80	25.0	25.2	0.2	1.1	0.30	0.3

9. Tone burst response

Time Weighting	Toneburst Duration, T _b (ms)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Fast	200	115.9	-0.1	±1.0	0.20	0.3
	2	98.1	-0.9	+1.0; -2.5	0.20	0.3
	0.25	89.2	-0.8	+1.5; -5.0	0.20	0.3
Slow	200	109.5	-0.1	±1.0	0.20	0.3
	2	89.8	-0.2	+1.0; -5.0	0.20	0.3
SEL	200	109.9	-0.1	±1.0	0.20	0.3
	2	90.0	0.0	+1.0; -2.5	0.20	0.3
	0.25	80.9	-0.1	+1.5; -5.0	0.20	0.3

Date of Calibration : 24-27 Feb.2025

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CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number: E03N199E80A0020 Reference Number: 82-401285019-1
Cylinder Number: LL193324 Cylinder Volume: 83.4 CF
Laboratory: 124 - Riverton (SAP) - NJ Cylinder Pressure: 2215 PSIG
PGVP Number: B52018 Valve Outlet: 660
Gas Code: NO,NOX,SO2,BALN Certification Date: Sep 05, 2018

Expiration Date: Sep 05, 2026

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012) document EPA-600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.
Do not use this cylinder below 100 psig, i.e. 6.7 megapascals.

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
NOX	50.00 PPM	50.71 PPM	G1	±1.4% NIST Traceable	08/27/2018, 09/05/2018
NITRIC OXIDE	50.00 PPM	50.67 PPM	G1	±1.4% NIST Traceable	08/27/2018, 09/05/2018
SULFUR DIOXIDE	50.00 PPM	50.54 PPM	G1	±1.0% NIST Traceable	08/27/2018, 09/05/2018
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	10000625	C0442585	50.42 PPM NITRIC OXIDE/NITROGEN	±1.0%	Jun 27, 2020
PRM	12368	9604119	29.86 PPM NITROGEN DIOXIDE/AIR	±1.5%	Jun 02, 2017
GMS	7042010194	C0503941	5.101 PPM NITROGEN DIOXIDE/NITROGEN	±2.0%	Jun 01, 2020
NTRM	14010327	KAL004378	49.68 PPM SULFUR DIOXIDE/NITROGEN	±1.0%	Apr 17, 2024

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

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Nicolet 6700 AP/V1100391 NO	FTIR	Aug 09, 2018
Nicolet 6700 AP/V1100391 NO2	FTIR	Aug 31, 2018
Nicolet 6700 AP/V1100391 SO2	FTIR	Aug 30, 2018

Triad Data Available Upon Request

NOTES: PO# 5218003935

Net weight: 2736 grams
Gross weight: 17393 grams

This calibration std. has been certified in accordance with the May 2012 EPA Traceability Protocol Document EPA-600/R-12/531. All testing processes and measurements conform to the requirements of ISO/IEC 17025 and to Airgas ISO 9001:2008 and relate only to items identified on this certificate. These items are certified to be NIST Traceable with total uncertainty as detailed under Analytical Uncertainty. This document shall not be reproduced in full without written approval of the issuer.

ACCREDITED

TESTING CERT No. 3082.05

Approved for Release

CERTIFICATE OF ANALYSIS **Grade of Product: EPA Protocol**

Part Number: E03N199E80A0020 Reference Number: 82-401285019-1
Cylinder Number: LL193324 Cylinder Volume: 83.4 CF
Laboratory: 124 - Riverton (SAP) - NJ Cylinder Pressure: 2215 PSIG
PGVP Number: B52018 Valve Outlet: 660
Gas Code: NO,NOX,SO2,BALN Certification Date: Sep 05, 2018

Expiration Date: **Sep 05, 2026**

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA-600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.
Do not use this cylinder below 100 psig, i.e. 6.7 megapascals

ANALYTICAL RESULTS					
Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
NOX	50.00 PPM	50.71 PPM	G1	+/- 1.4% NIST Traceable	08/27/2018, 09/05/2018
NITRIC OXIDE	50.00 PPM	50.67 PPM	G1	+/- 1.4% NIST Traceable	08/27/2018, 09/05/2018
SULFUR DIOXIDE	50.00 PPM	50.54 PPM	G1	+/- 1.0% NIST Traceable	08/27/2018, 09/05/2018
NITROGEN	Balance				

CALIBRATION STANDARDS					
Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	16060625	CC442585	50.42 PPM NITRIC OXIDE/NITROGEN	+/- 0.8%	Jun 27, 2020
PRM	12368	5604119	29.86 PPM NITROGEN DIOXIDE/AIR	+/- 1.5%	Jun 02, 2017
GMIS	7042010194	CC503941	5.101 PPM NITROGEN DIOXIDE/NITROGEN	+/- 2.0%	Jun 01, 2020
NTRM	14010327	KAL004376	49.08 PPM SULFUR DIOXIDE/NITROGEN	+/- 1.0%	Apr 17, 2024

ANALYTICAL EQUIPMENT		
Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Nicolet 6700 APW1100391 NO	FTIR	Aug 09, 2018
Nicolet 6700 APW1100391 NO2	FTIR	Aug 31, 2018
Nicolet 6700 APW1100391 SO2	FTIR	Aug 30, 2018

Triad Data Available Upon Request

NOTES:PO# 5218003935

Net weight: 2736 grams
Gross weight: 17393 grams

This calibration std. has been certified in accordance with the May 2012 EPA Traceability Protocol Document EPA-600/R-12/531. All testing processes and measurements conform to the requirements of ISO/IEC 17025 and to Airgas ISO 9001:2008 and relate only to items identified on this certificate. Values are certified to be NIST Traceable with total uncertainty as detailed under Analytical Uncertainty. This document shall not be reproduced in full without written approval of the issuer.



[Signature]
Approved for Release

บริษัท ยูไนเต็ด แอนนาลิสต์ แอนด์ เอ็นจิเนียริง คอนซัลแตนท์ จำกัด

List of Instruments Certification for Air & Noise Quality Analysis

No.	Instrument/Equipment	Parameter	Manufacturer	Model/Serial No.	Calibrator	Certification No.	Date of Calibration	Due date of Calibration	Remark
Stack									
1	Pre-Test Console	Total Suspended Particulate Hydrogen Sulfide Methanethiol Dimethyl Sulfide Dichlorine Chloride	Apex Instruments, USA.	XC-572-V 0807047	Envi Equipment Service Co., Ltd.	E24-080074	26 Aug 24	25 Aug 25	-
2	Pre-Test Console	Total Suspended Particulate Hydrogen Sulfide Methanethiol Dimethyl Sulfide Dichlorine Chloride	Apex Instruments, USA.	XC-572-V 0807048	Envi Equipment Service Co., Ltd.	E24-070061	23 Jul 24	22 Jul 25	-
3	Flue gas Analyzer	Sulphur Dioxide Oxide of Nitrogen as Nitrogen Dioxide	Testo	Testo 350 60723967	Entech Industrial Sulation Co., Ltd.	G 670643	13 Sep 24	12 Sep 25	-
4	Flue gas Analyzer	Sulphur Dioxide Oxide of Nitrogen as Nitrogen Dioxide	Testo	Testo 350 60899617/701	Entech Industrial Sulation Co., Ltd.	G 670763	31 Oct 24	30 Oct 25	-

CERTIFICATE OF CALIBRATION

Customer : United Analyst and Engineering Consultant Co., Ltd.
Address : 81 Soi Udomsuk 41, Sukhumvit Road, Banchak, Phrakhanong, Bangkok 10260
Description of Equipment : Console meter
Manufacturer : Apex Instrument
Model Number : XC-572-V
Serial Number : 0807047
ID./Control No. : UAE/ANV 212/2551
Environment Conditions : Temperature (25 ± 2) °C
Humidity (50 ± 15) % RH
Cal. Date : 26/08/2024
Issue Date : 26/08/2024

Calibration Method or Calibration Procedure Used

US EPA Method (United State Environmental Protection Agency)

This certificate is traceable to national standard, which realize the units of measurement according to the International System of Units (SI).

Result of Calibration

This certificate may not be reproduced other than in full except with prior Written approval of the Technical Manager, Envi Equipment Service Company Limited.

These reported uncertainties of measurement are expanded by a coverage factor of k=2, providing a 95% confidence level

Calibrated by : Mr. Sanya Sangnil

Approved by :

(Mr. Mana Fuekhud)

Technical Manager

เอกสารไม่ควบคุม

METHOD 5 CONSOLE CALIBRATION
USING REFERENCE WET GAS METER W-NK-2.5-B-Z No.547425
5-POINT METRIC UNIT

Meter Console Information		Calibration Conditions				Factors/Conversions		
Console Model Number	XC-572-V	Date	Time	26/08/2024	01:10 PM	Std Temp	293	K
Console Serial Number	0807047	Calibration Reference No.	SER24-080032			Std Press	760	mm Hg
DGM Model Number	SK25EX	Barometric Pressure	755.91			K ₁	0.386	
DGM Serial Number	00003580	Calibration Meter Gamma	1.001			Console Leak Check	PASS	

Calibration Data									
Run Time		Metering Console				Calibration Meter			
Elapsed	DGM Orifice DH	Volume Initial	Volume Final	Outlet Temp Initial	Outlet Temp Final	Volume Initial	Volume Final	Outlet Temp Initial	Outlet Temp Final
(Q)	(P _{in})	(V _{in})	(V _{out})	(t _{in})	(t _{out})	(V _{wi})	(V _{wf})	(t _{wi})	(t _{wf})
min	mm H ₂ O	m ³	m ³	°C	°C	m ³	m ³	°C	°C
11.88	13.0	1160.277	1160.417	24	24	249.83548	249.97320	25	25
11.87	13.0	1160.417	1160.557	23	23	249.97320	250.11036	25	25
8.47	26.0	1160.565	1160.705	23	23	250.11794	250.25472	25	25
8.43	26.0	1160.705	1160.845	23	23	250.25472	250.39116	25	25
13.70	40.0	1160.856	1161.136	24	24	250.39676	250.67384	25	25
13.63	40.0	1161.136	1161.416	24	24	250.67384	250.94928	25	25
10.27	70.0	1161.428	1161.708	25	25	250.95446	251.23044	25	25
10.23	70.0	1161.708	1161.988	26	26	251.23044	251.50574	25	25
8.98	90.0	1162.001	1162.281	26	26	251.51066	251.78586	24	24
8.95	90.0	1162.281	1162.561	27	27	251.78586	252.06032	24	24



เอกสารไม่ควบคุม

METHOD 5 CONSOLE CALIBRATION
USING REFERENCE WET GAS METER W-NK-2.5-B-Z No.547425
5-POINT METRIC UNIT

Meter Console Information		Calibration Conditions				Factors/Conversions		
Console Model Number	XC-572-V	Date	Time	26/08/2024	01:10 PM	Std Temp	293	K
Console Serial Number	0807047	Calibration Reference No.	SER24-080032			Std Press	760	mm Hg
DGM Model Number	SK25EX	Barometric Pressure	755.91			K ₁	0.386	
DGM Serial Number	00003580	Calibration Meter Gamma	1.001			Console Leak Check	PASS	

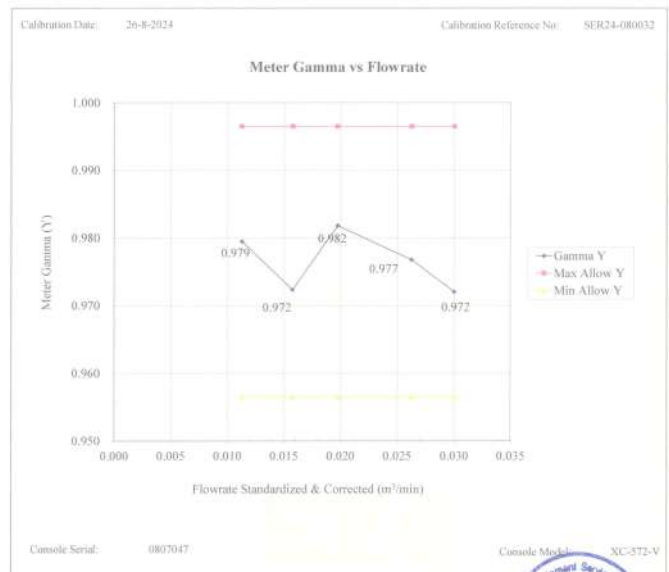
Calibration Data									
Results									
Standardized Data		Dry Gas Meter							
		Calibration Factor		Flowrate					
		Value	Variation	Std & Corr	Std & Corr	Std & Corr	Variation		
Dry Gas Meter	Calibration Meter	(Y)	(ΔY)	(Q _{std})	(ΔH _g)	(ΔH _g)	(ΔH _g)		
(V _{std})	(Q _{std})	(V _{wst})	(Q _{wst})	(Y)	(ΔY)	(Q _{std})	(ΔH _g)	(ΔH _g)	(ΔH _g)
m ³	m ³ /min	m ³	m ³ /min			m ³ /min	mm H ₂ O		
0.137	0.012	0.135	0.011	0.981	0.005	0.011	44.831	-0.558	
0.137	0.012	0.134	0.011	0.977	0.001	0.011	45.071	-0.318	
0.137	0.016	0.134	0.016	0.974	-0.003	0.016	46.259	0.870	
0.137	0.016	0.133	0.016	0.971	-0.005	0.016	46.125	0.736	
0.275	0.020	0.271	0.020	0.985	0.008	0.020	45.532	0.143	
0.275	0.020	0.269	0.020	0.979	0.002	0.020	45.628	0.240	
0.276	0.027	0.270	0.026	0.978	0.001	0.026	45.368	-0.021	
0.276	0.027	0.269	0.026	0.976	-0.001	0.026	45.297	-0.092	
0.277	0.031	0.270	0.030	0.973	-0.003	0.030	44.935	-0.454	
0.277	0.031	0.269	0.030	0.971	-0.006	0.030	44.843	-0.546	
		0.977	Y Average			45.389	ΔH _g Average		

Note: For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter, acceptable tolerance of individual values from the average is ±0.02.

For ΔH_g, orifice pressure differential that equates to 0.75 cfm (0.0212 m³/min) at standard temperature and pressure, acceptable tolerance of individual values from the average is ±0.2 inches (5.1mm) H₂O.

เอกสารไม่ควบคุม

Meter Console Information		Calibration Conditions				Factors/Conversions		
Console Model Number	XC-572-V	Date	Time	26/08/2024	01:10 PM	Std Temp	293	K
Console Serial Number	0807047	Calibration Reference No.	SER24-080032			Std Press	760	mm Hg
DGM Model Number	SK25EX	Barometric Pressure	755.91			K ₁	0.386	
DGM Serial Number	00003580	Calibration Meter Gamma	1.001			Console Leak Check	PASS	



เอกสารไม่ควบคุม

Meter Console Information		Calibration Conditions				Factors/Conversions		
Console Model Number	XC-572-V	Date	Time	26/08/2024	01:10 PM	Std Temp	293	K
Console Serial Number	0807047	Calibration Reference No.	SER24-080032			Std Press	760	mm Hg
DGM Model Number	SK25EX	Barometric Pressure	755.91			K _i	0.386	
DGM Serial Number	00003580	Calibration Meter Gamma	1.001			Console Leak Check	PASS	



THERMOCOUPLES SYSTEM CALIBRATION

Sampling System Equipment Information		Calibration Conditions			
Console Model Number	XC-572-V	Date	Time	26/08/2024	03:10 PM
Console Serial Number	0807047	Calibration Reference No.	SER24-080032		
DGM Model Number	SK25EX	Reference Thermometer	DIGICON		
DGM Serial Number	00003080	Serial Number	183169105		
Meter Box Model Number	JENCO 765 KF				
Meter Box Serial Number	JC 19778				

Results										
Console Thermocouple Simulator										
Channel and test point	Meter Box Channel Temperature Reading (°C)									
	-18.0	25.0	38.0	93.0	149.0	260.0	371.0	482.0	593.0	1038.0
Stack	-17.0	25.0	38.0	92.0	147.0	256.0	368.0	485.0	590.0	1036.0
Aux	-17.0	25.0	38.0	92.0	147.0					
Probe	-17.0	25.0	38.0	92.0	147.0					
Filter	-17.0	25.0	38.0	92.0	147.0					
Oven	-17.0	25.0	38.0	92.0	147.0					
Exit	-17.0	25.0	38.0							

Tolerance Range			
Stack	± 1.50%	Absolute	Meter ± 3.0 °C
Probe	± 3.0 °C		Exit ± 2.0 °C
Filter	± 3.0 °C		



Envi Equipment Service Co., Ltd.
110/254 Moo 3, Tambon Bang Rak Phatthana, Amphur Bang Bua Thong, Nonthaburi 11110
Tel. 098 362 9152, 089 478 7885
E-mail: sales@envi-ees.com

Certificate No.: E24-070061
Page: 1 of 6

CERTIFICATE OF CALIBRATION

Customer	: United Analyst and Engineering Consultant Co., Ltd.
Address	: 81 Soi Udomsuk 41, Sukhumvit Road, Bangehak, Phrakhanong, Bangkok 10260
Description of Equipment	: Console meter
Manufacturer	: Apex Instrument
Model Number	: XC-572-V
Serial Number	: 0807048
ID/Control No.	: UAE.ANV. 213/2551
Environment Conditions	: Temperature (25 ± 2) °C Humidity (50 ± 15) % RH
Cal. Date	: 23/07/2024
Issue Date	: 23/07/2024

Calibration Method or Calibration Procedure Used

(US EPA Method (United State Environmental Protection Agency))

This certificate is traceable to national standard, which realize the units of measurement according to the International System of Units (SI).

Result of Calibration

This certificate may not be reproduced other than in full except with prior Written approval of the Technical Manager, Envi Equipment Service Company Limited.

These reported uncertainties of measurement are expanded by a coverage factor of k=2, providing a 95% confidence level



Calibrated by : Mr. Sanya Sangnil

Approved by : (Mr. Mana Fuchuan)
Technical Manager

เอกสารไม่ควบคุม

METHOD 5 CONSOLE CALIBRATION
USING REFERENCE WET GAS METER W-NK-2.5-B-Z, No.547425
5-POINT METRIC UNIT

Meter Console Information		Calibration Conditions				Factors/Conversions		
Console Model Number	XC-572-V	Date	Time	23/07/2024	09:30 AM	Std Temp	293	K
Console Serial Number	0807048	Calibration Reference No.	SER24-070026			Std Press	760	mm Hg
DGM Model Number	SK25EX	Barometric Pressure	755.91			K _i	0.386	
DGM Serial Number	00003811	Calibration Meter Gamma	1.001			Console Leak Check	PASS	

Calibration Data									
Run Time	Metering Console					Calibration Meter			
Elapsed	DGM Orifice DH	Volume Initial	Volume Final	Outlet Temp Initial	Outlet Temp Final	Volume Initial	Volume Final	Outlet Temp Initial	Outlet Temp Final
(Q)	(P _{in})	(V _{in})	(V _{out})	(t _{in})	(t _{out})	(V _{wi})	(V _{wf})	(t _{wi})	(t _{wf})
min	mm H ₂ O	m ³	m ³	°C	°C	m ³	m ³	°C	°C
12.80	13.0	1571.952	1572.092	30	30	238.20732	238.35208	28	28
12.87	13.0	1572.092	1572.232	30	30	238.35208	238.49672	28	28
8.90	26.0	1572.243	1572.383	29	29	238.51668	238.66174	27	27
8.87	26.0	1572.383	1572.523	29	29	238.66174	238.80612	27	27
14.20	40.0	1572.531	1572.811	30	30	238.81622	239.10386	27	27
14.17	40.0	1572.811	1573.091	30	30	239.10389	239.38968	26	26
10.53	70.0	1573.105	1573.385	30	30	239.40386	239.68674	26	26
10.50	70.0	1573.385	1573.665	31	31	239.68674	239.96910	26	26
9.27	90.0	1573.677	1573.957	31	31	239.97994	240.26246	25	25
9.28	90.0	1573.957	1574.237	31	31	240.26246	240.54548	25	25



เอกสารไม่ควบคุม

METHOD 5 CONSOLE CALIBRATION
USING REFERENCE WET GAS METER W-NK-2.5-B-Z No.547425
5-POINT METRIC UNIT

Meter Console Information		Calibration Conditions				Factors/Conversions		
Console Model Number	XC-572-V	Date	Time	23/07/2024	09:30 AM	Std Temp	293	K
Console Serial Number	0807048	Calibration Reference No.	SER24-070026			Std Press	760	mm Hg
DGM Model Number	SK25EX	Barometric Pressure	755.91	mmHg		K _f	0.386	
DGM Serial Number	00003811	Calibration Meter Gamma	1.001			Console Leak Check	PASS	

Calibration Data									
Results									
Standardized Data				Dry Gas Meter					
		Calibration Factor		Flowrate					
Dry Gas Meter	Calibration Meter	Value	Variation	Std & Corr					
(V _{meas})	(Q _{meas})	(V _{std})	(Q _{std})	(Y)	(ΔY)	(Q _{std/corr})	(ΔH _g)	(ΔH _g)	(ΔH _g)
m ³	m ³ /min	m ³	m ³ /min			m ³ /min	mm H ₂ O		
0.136	0.011	0.140	0.011	1.032	0.015	0.011	47.552	1.450	
0.136	0.011	0.140	0.011	1.031	0.014	0.011	48.128	2.026	
0.136	0.015	0.141	0.016	1.032	0.016	0.016	45.752	-0.350	
0.136	0.015	0.140	0.016	1.028	0.011	0.016	45.839	-0.263	
0.273	0.019	0.279	0.020	1.022	0.006	0.020	45.695	-0.407	
0.274	0.019	0.278	0.020	1.016	-0.001	0.020	45.918	-0.184	
0.275	0.026	0.275	0.026	1.002	-0.014	0.026	45.607	-0.496	
0.275	0.026	0.275	0.026	1.001	-0.016	0.026	45.485	-0.617	
0.276	0.030	0.276	0.030	0.999	-0.017	0.030	45.521	-0.581	
0.276	0.030	0.276	0.030	1.001	-0.015	0.030	45.524	-0.578	
				1.016	Y Average			46.102	ΔH _g Average

Note: For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter, acceptable tolerance of individual values from the average is ± 0.02 .
For ΔH_g , orifice pressure differential that equates to 0.75 cfm (0.0212 m³/min) at standard temperature and pressure, acceptable tolerance of individual values from the average is ± 0.2 inches (5.1mm) Water.



Meter Console Information		Calibration Conditions				Factors/Conversions		
Console Model Number	XC-572-V	Date	Time	23/07/2024	09:30 AM	Std Temp	293	K
Console Serial Number	0807048	Calibration Reference No.	SER24-070026			Std Press	760	mm Hg
DGM Model Number	SK25EX	Barometric Pressure	755.91	mmHg		K _f	0.386	
DGM Serial Number	00003811	Calibration Meter Gamma	1.001			Console Leak Check	PASS	



Meter Console Information		Calibration Conditions				Factors/Conversions		
Console Model Number	XC-572-V	Date	Time	23/07/2024	09:30 AM	Std Temp	293	K
Console Serial Number	0807048	Calibration Reference No.	SER24-070026			Std Press	760	mm Hg
DGM Model Number	SK25EX	Barometric Pressure	755.91	mmHg		K _f	0.386	
DGM Serial Number	00003811	Calibration Meter Gamma	1.001			Console Leak Check	PASS	



THERMOCOUPLES SYSTEM CALIBRATION

Sampling System Equipment Information				Calibration Conditions			
Console Model Number	XC-572-V	Date	Time	23/07/2024	11:45 AM		
Console Serial Number	0807048	Calibration Reference No.	SER24-070026				
DGM Model Number	SK25EX	Reference Thermometer	DIGICON				
DGM Serial Number	00003811	Serial Number	183169105				
Meter Box Model Number	JENCO 765 KF						
Meter Box Serial Number	JC 08944						

Results											
Console Thermocouple Simulator											
Channel and test point	Meter Box Channel Temperature Reading (°C)										
	-18.0	25.0	38.0	93.0	149.0	260.0	371.0	482.0	593.0	816.0	1038.0
Stack	-18.0	24.0	37.0	92.0	148.0	258.0	371.0	482.0	594.0	816.0	1039.0
Aux	-18.0	24.0	37.0	92.0	148.0						
Probe	-18.0	24.0	37.0	92.0	148.0						
Filter	-18.0	24.0	37.0	92.0	148.0						
Exit	-18.0	24.0	37.0								

Stack $\pm 1.50\%$ Absolute Tolerance Range Meter $\pm 3.0^\circ\text{C}$
Probe $\pm 3.0^\circ\text{C}$ Exit $\pm 2.0^\circ\text{C}$
Filter $\pm 3.0^\circ\text{C}$



Certificate No: G 670643
Date of issue : 13-Sep-24

Instrument description : Flue Gas Analyzer
Instrument model : Testo 350 New
Instrument serial no. : 60723967/609
Control unit serial no. : 03064673/609
ID no. or control no. : UAE.EFM.027/2559
Manufacturer : Testo SE & Co. KGaA
Probe description : -
Probe model : -
Probe serial no. : -
Customer name : UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.
Customer address : 81 SOI UDOMSUK41,SUKHUMVIT ROAD,BANGCHAK PRAKANONG BANGKOK 10260

Total pages of certificate : 2 Pages
Receiving no. : L-243478
Receiving date. : 06-Sep-24
Parameter of calibration : Gas Calibration(Oxygen 2.50,10.04,21.02 %vol, Carbon Monoxide 80.18,302,1007 ppm, Nitrogen Dioxide 30.68,81.32,201.9 ppm, Nitric Oxide 30.01,151.5,322.5 ppm, Sulphur Dioxide 50.36,100.8,600.8 ppm)

Condition of UUC. : Used
Ambient condition : All of the Measurement were carried out the stabilized laboratory
Temperature : 23 ± 5 °C
Humidity : 55 ± 15 %RH

Calibration place : 17/121 Soi Ngamwongwan 47 Yaek 48, Toongsonghong, Laksi, Bangkok 10210

Calibration procedure no. : This instrument was calibrated by comparison with Standard gas mixture according to calibration Work Instruction no. WI-CL-28-C

The calibration certificate expanded uncertainty of measurement is stated as the standard uncertainty of measurement Multiplied by coverage factor $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%. This certificate is applied only to item under test Environmental condition.
This Calibration Certificate may not be reproduced other than in full except with the permission of the issuing laboratory. Calibration certificates without signature and seal not valid and The results relate only to the items tested/calibrated.
This calibration certificate documents are traceability to national standards, which realize measurement according to the International System of Units (SI).
Date of calibration : 13-Sep-24

Kunmohit
Mr. Kwanchai Khamdoun
Calibration Technician

Wittu
Mrs. Nongluck Wongsettee
Technical Manager

FM-CL-09-C Rev.8

Page 1 of 2

Issued Date 26/02/16

เอกสารไม่ควบคุม

Certificate No: G 670763
Date of issue : 31-Oct-24

Instrument description : Flue Gas Analyzer
Instrument model : Testo 350 New
Instrument serial no. : 60899617/701
Control unit serial no. : 03099402/701
ID no. or control no. : UAE.EFM. 007/2560
Manufacturer : Testo SE & Co. KGaA
Probe description : -
Probe model : -
Probe serial no. : -
Customer name : United Analyst and Engineering Consultant Co., Ltd.
Customer address : 81 Soi Udomsuk 41, Sukhumvit Rd., Bangchak, Phrakhanong, Bangkok 10260

Total pages of certificate : 2 Pages
Receiving no. : L-244222
Receiving date. : 30-Oct-24
Parameter of calibration : Gas Calibration(Oxygen 2.50,9.984,21.02 %vol, Carbon Monoxide 80.18,302,1007 ppm, Nitrogen Dioxide 30.68, 81.8, 201.9 ppm, Nitric Oxide 30.0, 151.5, 322.5 ppm, Sulphur Dioxide 50.36, 100.8, 600.8 ppm)

Condition of UUC. : Used
Ambient condition : All of the Measurement were carried out the stabilized laboratory
Temperature : 23 ± 5 °C
Humidity : 55 ± 15 %RH

Calibration place : 17/121 Soi Ngamwongwan 47 Yaek 48, Toongsonghong, Laksi, Bangkok 10210

Calibration procedure no. : This instrument was calibrated by comparison with Standard gas mixture according to calibration Work Instruction no. WI-CL-28-C

The calibration certificate expanded uncertainty of measurement is stated as the standard uncertainty of measurement Multiplied by coverage factor $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%. This certificate is applied only to item under test Environmental condition.
This Calibration Certificate may not be reproduced other than in full except with the permission of the issuing laboratory. Calibration certificates without signature and seal not valid and The results relate only to the items tested/calibrated.
This calibration certificate documents are traceability to national standards, which realize measurement according to the International System of Units (SI).
Date of calibration : 31-Oct-24

Kunmohit
Mr. Kwanchai Khamdoun
Calibration Technician

Wittu
Mrs. Nongluck Wongsettee
Technical Manager

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Certificate No.: G 670643

Standard References (Table 1)

Standard	Certificate No.	Vendor	Due date
Oxygen (O2) 2.50 % Vol	2412/23	Linde	27-Aug-27
Oxygen (O2) 10.04 % Vol	CG-0153-21	Nimrt	18-Nov-26
Oxygen (O2) 21.02 % Vol	CG-0041-22	Nimrt	10-Feb-27
Carbon monoxide (CO) 80.18 ppm	CG-0002-24	Nimrt	11-Jan-29
Carbon monoxide (CO) 302 ppm	1915/23	Linde	16-Jun-25
Carbon monoxide (CO) 1007 ppm	1870/24	Linde	17-Jun-26
Nitrogen Dioxide (NO2) 30.68 ppm	2832/24	Linde	08-Sep-26
Nitrogen Dioxide (NO2) 81.32 ppm	3546/23	Linde	14-Jun-25
Nitrogen Dioxide (NO2) 201.9 ppm	1975/23	Linde	17-Jul-25
Nitric Oxide (NO) 30.01 ppm	CG-0014-23	Nimrt	19-Feb-25
Nitric Oxide (NO) 151.5 ppm	0161/23	Linde	22-Jan-25
Nitric Oxide (NO) 322.5 ppm	1974/23	Linde	17-Jul-25
Sulphur Dioxide (SO2) 50.36 ppm	2004/23	Linde	17-Jul-25
Sulphur Dioxide (SO2) 100.8 ppm	3507/22	Linde	09-Nov-24
Sulphur Dioxide (SO2) 600.8 ppm	2003/23	Linde	17-Jul-25

Measured room conditions

Temperature : 22.7 °C Humidity : 61.2 %RH Pressure : 1010.7 mbar

Calibration conditions

Gas Temperature : 23 °C Flow rate : 1,200 ml/min Gas pressure : 1013.8 mbar

Calibration Results (Without adjustment) (Table 2)

Parameter of Standard	Standard Values	Mean of UUC	Error	Uncertainty (±)
O2 (%Vol)	2.50	2.47	-0.03	0.15
O2 (%Vol)	10.04	10.11	0.07	0.20
O2 (%Vol)	21.02	21.12	0.10	0.30
CO (ppm)	80.18	81	0.82	3.0
CO (ppm)	302	304	2	6.0
CO (ppm)	1007	1011	4	12
NO2 (ppm)	30.68	32.9	2.56	8.0
NO2 (ppm)	81.32	80.2	-1.12	8.0
NO2 (ppm)	201.9	204.2	2.3	12
NO (ppm)	30.01	31	0.99	8.0
NO (ppm)	151.5	154	2.5	8.0
NO (ppm)	322.5	324	1.5	12
SO2 (ppm)	50.36	51	0.64	6.0
SO2 (ppm)	100.8	100	-0.8	6.0
SO2 (ppm)	600.8	598	-2.8	13

Remark : 1 cmol/mol = 1 %vol, 1 µmol/mol = 1 ppm.

End of Report

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Certificate No.: G 670763

Standard References (Table 1)

Standard	Certificate No.	Vendor	Due date
Oxygen (O2) 2.50 % Vol	2412/23	Linde	27-Aug-27
Oxygen (O2) 9.984 % Vol	CG-0113-24	Nimrt	01-Aug-29
Oxygen (O2) 21.02 % Vol	CG-0041-22	Nimrt	10-Feb-27
Carbon monoxide (CO) 80.18 ppm	CG-0002-24	Nimrt	11-Jan-29
Carbon monoxide (CO) 302 ppm	1915/23	Linde	16-Jun-25
Carbon monoxide (CO) 1007 ppm	1870/24	Linde	17-Jun-26
Nitrogen Dioxide (NO2) 30.68 ppm	2832/24	Linde	08-Sep-26
Nitrogen Dioxide (NO2) 81.8 ppm	2330/24	Linde	01-Aug-26
Nitrogen Dioxide (NO2) 201.9 ppm	1975/23	Linde	17-Jul-25
Nitric Oxide (NO) 30.0 ppm	CG-0065-24	Nimrt	06-May-26
Nitric Oxide (NO) 151.5 ppm	0161/23	Linde	22-Jan-25
Nitric Oxide (NO) 322.5 ppm	1974/23	Linde	17-Jul-25
Sulphur Dioxide (SO2) 50.36 ppm	2004/23	Linde	17-Jul-25
Sulphur Dioxide (SO2) 100.8 ppm	3507/22	Linde	09-Nov-24
Sulphur Dioxide (SO2) 600.8 ppm	2003/23	Linde	17-Jul-25

Measured room conditions

Temperature : 23.2 °C Humidity : 67.4 %RH Pressure : 1010.1 mbar

Calibration conditions

Gas Temperature : 23 °C Flow rate : 1,200 ml/min Gas pressure : 1013.5 mbar

Calibration Results (Without adjustment) (Table 2)

Parameter of Standard	Standard Values	Mean of UUC	Error	Uncertainty (±)
O2 (%Vol)	2.50	2.46	-0.04	0.15
O2 (%Vol)	9.984	9.92	-0.064	0.20
O2 (%Vol)	21.02	21.14	0.12	0.30
CO (ppm)	80.18	79	-1.18	3.0
CO (ppm)	302	302	0	6.0
CO (ppm)	1007	1005	-2	12
NO2 (ppm)	30.68	32.3	1.62	8.0
NO2 (ppm)	81.8	80.5	-1.3	8.0
NO2 (ppm)	201.9	200.2	-1.7	12
NO (ppm)	30.0	31	1.0	8.0
NO (ppm)	151.5	154	2.5	8.0
NO (ppm)	322.5	322	-0.5	12
SO2 (ppm)	50.36	51	0.64	6.0
SO2 (ppm)	100.8	101	0.2	6.0
SO2 (ppm)	600.8	603	2.2	13

Remark : 1 cmol/mol = 1 %vol, 1 µmol/mol = 1 ppm., Sensor CO, NO, SO2 New Sensor

End of Report

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List of Instrument Certificates for Environmental Quality Analysis

No.	Instrument/Equipment	Parameter	Manufacturer	Model/Serial No.	Calibrator	Certification No.	Date of Calibration	Due date of Calibration*
1	Atomic Absorption Spectrometer	ARSENIC (wet weight) CADMIUM (wet weight) CHROMIUM (wet weight) LEAD (wet weight) MERCURY (wet weight) SELENIUM (wet weight)	Agilent Technologies	AA240FS / MY13160001	Agilent Technologies (Thailand) Co.,Ltd.	Preventive Maintenance Checklist	30/1/2025	29/1/2026
2	Inductively Coupled Plasma- Optical Emission Spectrometer(ICP-OES)	BARIUM (wet weight) SILVER (wet weight)	Agilent Technologies, USA	5110 VDV(G8015AA) / MY8030001	Agilent Technologies (Thailand) Co.,Ltd.	Preventive Maintenance Checklist	4/11/2024	3/11/2025
3	pH Meter and pH Electrode	pH (1:1)	Mettler Toledo	pH S20 SevenEasyTM / 1231155210	National Food Institute Ministry of Industry, Thailand	2501844-001-01	24/2/2025	23/2/2026

Due Date of Calibration* : Based on the annual calibration plan. At least 1 time per year.

Agilent 55 240 280 Series Atomic Absorption Spectroscopy Systems

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. This checklist will be completed at the end of the service and provided to you as a record of the installation.

Note: While non-current production AA instrument and/or accessory models are not covered specifically in this document it can be used as a basic reference.

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

Introduction

Customer Information

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

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Important Customer Web Links

- For more information about Agilent Technologies services, please visit our website using the following URL: <http://www.agilent.com/en-us/products/crosslab-instrument-services/service-repair>
- To access Agilent University, visit <http://www.agilent.com/crosslab/university/> to learn about training options, which include online, classroom and onsite delivery. A training specialist can work directly with you to help determine your best options.
- A useful Agilent Resource Center web page is available, which includes short videos on maintenance, quick lists of consumables for new instruments, and other valuable information. Check out the Resource Page here: <https://www.agilent.com/en-us/agilentresources>
- Need technical support, FAQs, supplies? – visit our Support Home page at <http://www.agilent.com/search/support>
- Get answers. Share insights. Build connections. Join the Agilent Community at <https://community.agilent.com/welcome>

Service Engineer's Responsibilities

- Contact the customer and ensure that all necessary supplies are available before the preventive maintenance visit.
 - Confirm the ability of the instrument to deliver continued safe operation as established via the Agilent AA safe operation flow chart. (Refer directly to the AA 55/240/280 Preventive Maintenance Scope of Work to make this decision.)
 - Only select those pages that relate to the system or module being serviced.
 - Complete empty fields with the relevant information.
 - Complete the relevant checkboxes in the checklist using either a "X" or tick mark "✓".
 - Check "Section not applicable" check boxes to indicate services/tasks not delivered, as appropriate.
 - Complete the Preventive Maintenance service in the order of the tasks listed.
 - Complete the Service Review section together with the customer.
 - Complete the fields for page numbers at the foot of each selected page
 - Complete the total number of pages field in the Service Completion section
 - Ask the customer to sign the Service Completion section including the customer's and your signature.
- This information is subject to change without notice.

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Instrument Maintenance

System Information

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

Instrument System Name and ID	240 FS AAS
Instrument System Site and Location	United Analyst and Engineering Consultant

List System Component Product Numbers	List the Serial Numbers of each Component
1. G 9432 A	M 13160001
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	

Preparation, Safe operation and Initial performance checks

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- ☐ Agilent AA safe operation flow chart inspections (to determine if the PM can be performed).

NOTE: If by following the flow chart the instrument is deemed to be unsafe for continued use you MUST NOT continue PM work. Inform the customer immediately of the Agilent recommendation that use of the instrument be discontinued.

- ☒ Discuss any specific issues with the customer before starting.
- ☐ For HF application systems, if standard sample introduction system was not installed, ask the customer to install it. 119
- ☒ Review the instrument logbook for recorded problems and comments.
- ☒ Save instrument control settings before starting the procedure.
- ☒ Perform a general inspection of the system for cleanliness.
- ☒ Check for proper installation of parts, assemblies, sensors etc.
- ☒ Check system for required installation of components, settings as defined by current Service Notes
- ☒ Check for required firmware updates and verify with customers if they would like them installed.
- ☒ Use SVD to perform a Full Wavelength Scan for Cu HCL - "As found test_1"
- ☒ Perform a Basic Cu ABS test - "As found test_2"
- ☒ Print the Details page or screen captures of the test results and attach to the end of this checklist.

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Preventive Maintenance Procedures

FLAME SYSTEM section

☐ Section not applicable

Electronic components

- ☒ Review and confirm instrument configuration data in SVD
- ☒ Confirm power supply voltages using the *SVD Power Supply diagnostic*.
- ☒ For Dual Beam Instruments - Confirm RBC frequency using the *SVD RBC frequency diagnostic*.

Mechanical components

- ☒ Check the burner adjuster controls for complete and free movement. If the burner adjuster needs lubrication, use Molykote 321 or mineral-based molybdenum disulphide grease.
- ☒ Run SVD tests to exercise all motor drives over the full range of their travel:
 - ☒ Monochromator drive
 - ☒ Slit drive
 - ☒ Lamp selector
 - ☐ ABA

Optics components

- ☒ Check that external optical surfaces are clean – Clean or replace as required.
- ☒ Use SVD and perform *Mono Wavelength Correction*.
- ☒ Use SVD and perform *Slit Calibration*.
- ☒ Use SVD and perform *Grating Squareness Diagnostic*.
- ☒ Use SVD and perform *Zero Order Offset/Mono Correction*.
- ☒ Use SVD and perform *Wavelength Repeatability*.
- ☒ Physically inspect selected HC lamps (customer to supply per their choice) and measure the % Gain for each lamp. Advise customer if lamps are showing emission degradation due to age.
- ☒ Check that the signal energy of the D2 and HC lamps track properly. Advise customer if their D2 lamp is showing emission degradation due to age.

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Sample Introduction and Atomization

- ☒ Inspect the burner interlock plate to ensure that the interlock pin is secure and correct for the burner type.
- ☒ Clean the burner slot with a clean white card.
- ☒ Check the uniformity of the slot width.
- ☒ Clean the burner if required.
- ☒ Change the burner o-ring.
- ☒ Clean the nebulizer, spray chamber and liquid trap.
- ☒ Change all o-rings and seals in the nebulizer, nebulizer block and spray chamber.
- ☒ Check that the pressure relief bung releases readily.
- ☒ Change o-rings on the fuel and oxidant delivery barbs.
- ☒ Leave the liquid trap EMPTY and verify the flame will not ignite in this state.
- ☒ Refill liquid trap and check that overflow drains freely into the drain/waste tube.
- ☒ Check the drain/waste tube for good drainage. It should not have tight bends, kinks or loops and the lower end must be above the liquid level in the waste vessel.
- ☒ Check and clean the igniter electrode.

Gas handling components and safety interlocks

- ☒ Pressure test for leaks
- ☒ Leak test gasbox internal components and connections
- ☒ Check safety interlock status and operation using the *SVD Interlock monitoring diagnostic*.

Analytical performance for Flame systems

- ☒ Ignite a flame.
- ☒ Check that you can adjust the nebulizer uptake rate from 4 to 6.5 mL per minute.
- ☒ Optimize the instrument ready to perform Cu sensitivity test.
- ☒ Create a manual method to perform a Basic Cu ABS test - "Final Performance Testing"
- ☒ Run a PM completed sensitivity test for a 5 ppm copper sample and record the results in the AA PM Performance test results and measurements table.

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FURNACE SYSTEM section

☒ Section not applicable

Electronic components

- ☐ Review and confirm instrument configuration data in SVD
- ☐ Confirm power supply voltages using the *SVD Power Supply diagnostic*.

Mechanical components

- ☐ Run SVD tests to exercise all motor drives over the full range of their travel:
 - ☐ Monochromator drive
 - ☐ Slit drive
 - ☐ Lamp selector

Optics components

- ☐ Check that external optical surfaces are clean – Clean or replace as required.
- ☐ Use SVD and perform *Mono Wavelength Correction*.
- ☐ Use SVD and perform *Slit Calibration*.
- ☐ Use SVD and perform *Grating Squareness Diagnostic*.
- ☐ Use SVD and perform *Zero Order Offset/Mono Correction*.
- ☐ Use SVD and perform *Wavelength Repeatability*.
- ☐ Physically inspect selected HC lamps (customer to supply per their choice) and measure the % Gain for each lamp. Advise customer if lamps are showing emission degradation due to age.

Gas handling, water system and workhead component checks

- ☐ Inspect the GTA workhead gas hoses and connections for leaks.
- ☐ Pressure test for gas leaks
- ☐ If the cooler system is accessible (stand-alone) check for correct operation and coolant/water level – this includes any temperature and pressure settings plus filter cleaning (air flow and water).
- ☐ Inspect the GTA workhead water hoses and connections for leaks.
- ☐ Check all graphite components and replace if necessary.

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- ☐ Tube
- ☐ Electrodes
- ☐ Shroud

- ☐ Check and clean the end windows on the workhead.
- ☐ Check safety interlock operation.

Analytical performance for Furnace systems

- ☐ Optimize the instrument ready to perform Cu sensitivity test.
- ☐ Run the sensitivity test for a 25 ppb copper sample and record the results in the results table.

PSD autosampler accessory for Furnace systems

☒ Section NOT Applicable

- ☐ Check condition of the PSD capillary – replace if necessary
- ☐ Check condition and operation of PSD syringe – ensure it does not have air locks and bubbles.
- ☐ Change PSD rinse bottle o-ring.
- ☐ Check and clean the rinse vessel.
- ☐ Check the drain tube for good drainage. It should not have tight bends, kinks or loops and the lower end must be above the liquid level in the waste vessel.
- ☐ Ensure that the waste vessel is suitable for use with the furnace system.

Sample introduction pump system (SIPS) accessory

☒ Section NOT Applicable

- ☐ Re-torque screws securing the hubs, presser arms and pump rotors.
- ☐ Adjust each roller so that it rotates freely.
- ☐ Wipe clean the pump rotor rollers and pump bands with a dry clean cloth.
- ☐ Ensure that the presser arms and the surfaces near the pump are free from dirt and spills.
- ☐ Remove the pump module rear cover and check for the incursion of liquids and any signs of corrosion.
- ☐ Re-torque the nuts that fasten the motor mounting plates to the chassis.
- ☐ Check clips securing the diluents holder and replace if necessary.
- ☐ Disconnect, clean T-piece, and reassemble the tubing using the following steps.

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- ☐ Remove the T-piece by disconnecting the pump tubes, the pump bands and all other tubing.
- ☐ Place the T-piece in an ultrasonic bath containing strong detergent 1-5% Decon 30 or similar, for approximately 5-10 minutes.
- ☐ Wash the T-piece under a tap with a strong flow of water.
- ☐ Rinse with distilled water through all of the inlets in the reverse direction to normal sample flow.
- ☐ Reassemble.

Sample preparation system (SPS 4) accessory

☒ Section NOT Applicable

The Agilent SPS 4 autosampler is designed to need minimal maintenance.

The following maintenance requirements are suggested to maintain the performance of the autosampler.

- ☐ Cleaning the spill tray, rack location mat, end frames and chassis accessories with a damp soft cloth and diluted mild detergent.
- ☐ Cleaning the autosampler cover panels with domestic window cleaner.
- ☐ Checking 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 edge or damaged connectors.

NOTE: The autosampler requires no extra lubrication throughout its lifetime.

For further details refer to the SPS 4 service manual G8410-90050.

Sample preparation system (SPS 3) accessory

☒ Section NOT Applicable

- ☐ Check the x-axis and z-axis timing belts – Replace if there is any cracks, splits or color deterioration and belt tension.
- ☐ Check belt tensions - adjust if required
- ☐ Check the lubrication pad for single x-axis shaft. If pad is dry or customer has observed any vibration or erratic movements of the x-axis carriage, add 1 mL of Dow Corning 200 @ Fluid, 200 CS into the well.
- ☐ Check the auto-sampler ability to find tube positions - Calibrate if required.
- ☐ Clean the exterior surfaces of the accessory with soft lint free cloth. This cloth can be dampened with warm water or a mild detergent. Do not use organic solvents or abrasive cleaning agents.

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Vapor generation accessory VGA (hydride generator)

☒ Section NOT Applicable

- ☐ Inspect VGA gas supply hose.
- ☐ Inspect/replace VGA pump tubing.
- ☐ Check low gas pressure interlock setting – adjust if required.
- ☐ Check precision orifice gas flow setting – adjust if required.
- ☐ Check gas regulator pressure to 46 psi (325 kPa) – adjust if required.
- ☐ Clean the exterior surfaces of the accessory with soft lint free cloth. This cloth can be dampened with warm water or a mild detergent. Do not use organic solvents or abrasive cleaning agents.

UltrAA lamp accessory (external)

☒ Section NOT Applicable

- ☐ Check the condition of the power cable.
- ☐ Clean the exterior surfaces of the accessory with soft lint free cloth. This cloth can be dampened with warm water or a mild detergent. Do not use organic solvents or abrasive cleaning agents.

Restore System

- ☐ If you have altered the customer's instrumentation during the course of PM, restore to the original status to allow the customer to conduct their normal activities (e.g., reload the customer's method.)

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.

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Signature Page

Service Review

- ☒ Attach available reports/printouts of all tests to this documentation.
- ☒ Record the Preventive Maintenance service activity in the customer's records/logbook.
- ☒ Update/reset instrument maintenance counters as appropriate.
- ☒ Affix the PM sticker to the system or instrument logbook based on the customer's request.
- ☒ Complete the Service Engineer Comments section if there are additional comments.
- ☒ Review this service, parts replaced, and test results obtained with the customer.
- ☒ If the instrument firmware was updated, record the details of the change in the Service Engineer's Comments box or if necessary, in the customer's IQ records.

Test Results

Test Description	Expected Test Result	Actual Test Result
Flame optics PMT Gain test		
For copper at 324.8 nm, 4 mA, 0.5 nm slit width	< 55 %	49 %
Flame performance test with 5 ppm copper sample		
Air /acetylene, mixing paddle removed	Abs value > 0.5	0.5599
Air /acetylene, mixing paddle installed, 10 replicates	%RSD < 1.0	0.2 %
Deuterium furnace optics PMT Gain test		
For copper at 324.8 nm, 4 mA, 0.5 nm slit width	< 55 %	-
Deuterium furnace performance test with 25 ppb copper sample (324.8 nm)		
Precision %RSD	≤ 4.0%	-
Abs value	≥ 0.15	-
Zeeman furnace analytical performance: 25 ppb copper sample (327.4 nm)		
Precision %RSD	≤ 4.0%	-
Abs value	≥ 0.10	-
MSRP%	≥ 70 %	-

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AA consumable and parts list table

Part Description	Part Number	Product/Model # where used	PM supplied or Consumable	Instrument-Type
Test Solution – Cu 5ppm solution	6610030100	50 55 140 240 280	PM supplied	Common
Test Solution - Blank solution	5190-7001	50 55 140 240 280	PM supplied	Common
Copper, 1000 ug/ml, 100ml	5190-8279	50 55 140 240 280	*	Common
Kit, Mk 7 O-rings, aqueous, complete set	9910093400	50 55 140 240 280	PM supplied	Flame
Organic Kit	9910093500	50 55 140 240 280	PM supplied	Flame
Wire Nebulizer Cleaning	9910024700	50 55 140 240 280	consumable	Flame
Tubing-Capillary Std Nebs	9910024800	50 55 140 240 280	consumable	Flame
Capillary Tube Hivac Neb (3) (organics only)	9910044000	50 55 140 240 280	consumable	Flame
Glass impact beads (5/pk)	9910025700	50 55 140 240 280	consumable	Flame
Teflon impact beads (5/pk): (organics only)	9910053300	50 55 140 240 280	consumable	Flame
Burner cleaning strip (100/pk)	9910053900	50 55 140 240 280	consumable	Flame
Window UV silica – round (right side)	2010082600	50 55 140 240 280	PM supplied	Common
Window UV silica – rectangular (left side)	2010082500	50 55 140 240 280	PM supplied	Common
Pad adhesive window (round)	4910012700	50 55 140 240 280	PM supplied	Common
Pad adhesive window (rectangular)	4910012800	50 55 140 240 280	PM supplied	Common
Electrode kit (1 pr) (D2)	6310003400	GTA120	PM supplied	Furnace
Shroud (D2)	6310003100	GTA120	PM supplied	Furnace
Zeeman electrode kit (1 pr)	6310003500	GTA120	PM supplied	Furnace
Zeeman shroud	6310003600	GTA120	PM supplied	Furnace
O-ring PSD rinse bottle	6910025900	PSD120	PM supplied	Furnace

* For engineers who only service AA instruments 5190-8279 can be used as a cheaper alternative for 6610030100.

Items classified as PM supplied in the above table are included in the standard PM

Those classified as consumable should be provided by the customer or charged to the customer if supplied by the Agilent service engineer.

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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.

Report ID: Diagnostic Start Time: 1/30/2025 9:14:28 AM Diagnostic End Time: 1/30/2025 9:49:08 AM
Customer: UAE Service Engineer: Kanyakorn S.
Address: Soi Udumuk 41, Sukhumvit Rd. Bangkok Contact Details: 026376363#1

Configuration:

Serial Number: MY13160001 Turret Type: Automatic
Instrument Model: Varian AA140/240/280 Number Of Lamps: 4
Flame Instrument: True Mono Type: Automatic
Furnace Instrument: True Gasbox Type: Y Gas Box
Zeeman Present: False Auto Burner Adjuster: False
Internal Zeeman: False Mains Frequency: 50
Internal UltraAA: False Firmware Version: 2.11
Optics Type: Double Beam Photomultiplier Type: Normal(900nm)
D2 BG Correction Fitted: True PWB Version: 45
Boot Block Version: 1.00

EEPROM Data:

Instrument Run Hours: 62819.180 D2 Run Hours: 53396.500
Zero Wavelength Offset: 30.133 D2 Serial Number: not set!
D2 Install Date: 1/1/1970
Mono Correction: 0.770 D2 Original Intensity: 1.000
Flame Hours: 32411.834 D2 Last Intensity: 475.000

Service Completion

Service request number: 6007549143 Date service completed: 30 Jan 2025
Agilent signature: Kanyakorn S. Customer signature: [Signature]
Total number of pages in this document: 13



เอกสารไม่ควบคุม

Frequency:

Averaging Period: 30.0
Datapoint Count: 20
Upper Limit: 51.00
Lower Limit: 49.00
Average Frequency: 50.00
Highest Measured Frequency: 50.00
Lowest Measured Frequency: 50.00
Result: **Passed**

Power Supply:

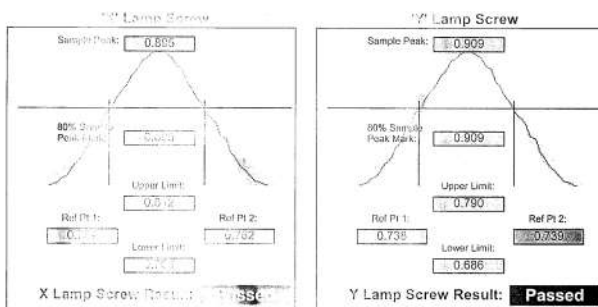
Averaging Period: 30.0
Datapoint Count: 20

	Lower Limit (V)	Actual (V)	Upper Limit (V)	Result:
12.00 V Rail	10.80	12.12	13.20	Passed
-12.00 V Rail	-13.20	-11.90	-10.80	Passed
5.00 V Rail	4.50	5.04	5.50	Passed
310.00 V Rail	279.00	320.00	341.00	Passed

Optics

Beam Balance:

Lamp Type: Copper
Lamp Socket Used: 3
Peak Selected: 324.80
Lamp Alignment: **Performed**



Grating Spectrometer

Lamp Element(s): Copper
Lamp Turret Position: 3
Lamp Current(mA): 4.00
Slit Width(nm): 0.5
1st Zero Wavelength(nm): 324.80
Lamp Alignment: **Performed**

	Lower Limit (nm)	Actual (nm)	Upper Limit (nm)	Result:
Zero Order	-0.10	0.00	0.10	Passed
First Order	324.05	324.75	325.15	Passed
Second Order	648.09	649.51	649.97	Passed

เอกสารไม่ควบคุม

เอกสารไม่ควบคุม

Wavelength Repeats: 2

Lamp Used: Copper
Peak Used(nm): 324.759
Connected to Socket: 3

Lamp Current(mA): 4
Slit Width(nm): 0.2
Slit Height: Normal

Lamp Alignment:

Lower Limit(nm) 324.759 Upper Limit(nm) 324.888

(High end from Zero Drive) (Low end from Zero Drive)

Sample 1: 324.873 Sample 2: 324.823
Sample 3: 324.873 Sample 4: 324.823
Sample 5: 324.823 Sample 6: 324.819
Sample 7: 324.819 Sample 8: 324.819
Sample 9: 324.823 Sample 10: 324.819

Absorbance: 0.000 Standard Deviation: 0.003

Result:

เอกสารไม่ควบคุม

Auto Lamp Recognition:

Lamp 1: Unloaded Lamp/Not Connected Lamp 5: Not Supported
Lamp 2: 87 - Silver Cadmium Lamp/Not Connected Lamp 6: Not Supported
Lamp 3: 14 - Copper (Cu) Lamp 7: Not Supported
Lamp 4: Unloaded Lamp/Not Connected Lamp 8: Not Supported

Result:

GTA Temperature Monitoring:

Notes:

Signatures:

Signature: Kanyakorn S. Date: 30 Jan 2025

เอกสารไม่ควบคุม

Wavelength Drive:

Slit Drive:

Turret Drive:

Auto Burner/Water Valve:

Signal Processing Linearity:

Calibrate: Auto: New Only Mode

	Lower Limit	Actual	Upper Limit	Result:
S0	114	114	297	
S1	198	198	191	
S2	271	271	332	
S3	474	474	579	
S4	936	936	1008	
S5	1435	1435	1754	
S6	2108	2108	3053	
S7	4047	4047	5313	

Interlocks:

Burner Flame:

H2O Burner Flame:

Flame Shield Closed:

Gas Control Flame:

Pressure Release During Flame:

Liquid Trap Closure:

Flame Detect:

ECU Active:

Oxidant Pressure:

Oxidant Changeover:

Ignition:

เอกสารไม่ควบคุม

Sequential by time report 1/30/2025 10:53 AM Page 1 of 1 SpectraA

Analyst:
Date Started: 1/30/2025 10:33 AM GMT: 1/30/2025 3:33 AM
Worksheet: Sensitivity Test 01
Comment:
Methods: Cu
Computer name: DESKTOP-R3UFRS
Serial Number: MY13160001

Method: Cu (Flame)

Sample ID	Conc. mg/L	%RSD	Mean Abs		
CAL ZERO	0.000	38.8	0.0002		
	Readings				
	0.0002	0.0003	0.0001	1/30/2025	10:51:46 AM
STANDARD 1	5.000	0.1	0.5571		
	Readings				
	0.5574	0.5563	0.5575	1/30/2025	10:52:22 AM

Abs Linear Origin - Cal. Set 1

Curve Fit = Linear Origin
Characteristic Conc = 0.030 mg/L
r = 1.0000
Calculated Conc = 0.002 5.000
Residuals = -0.007 0.000

Abs = 0.11141 x C

5 ppm Cu					
	5.025	0.3	0.5598		
	Readings				
	0.5592	0.5596	0.5615	1/30/2025	10:52:54 AM

เอกสารไม่ควบคุม

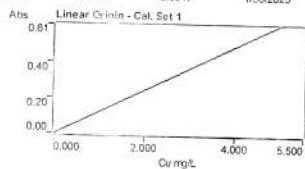
Analyst:
Date Started: 1/30/2025 10:33 AM GMT: 1/30/2025 3:33 AM
Worksheet: Precision Test
Comment:
Method: Cu
Computer name: DESKTOP-PSUFRS
Serial Number: MY13160001

Method: Cu (Flame)

Sample ID	Conc. mg/L	%RSD	Mean Abs
CAL ZERO	0.000	64.1	-0.0002
Readings			
	-0.0003	-0.0003	-0.0001
STANDARD 1	5.000	0.3	0.6052
Readings			
	0.6036	0.6073	0.6047

1/30/2025 10:46:52 AM

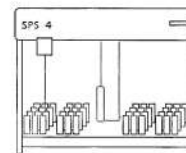
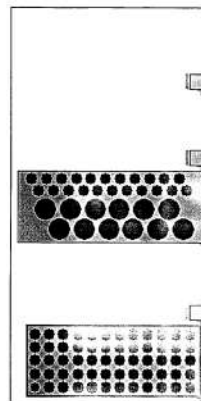
1/30/2025 10:47:24 AM



Curve Fit = Linear Origin
Characteristic Conc = 0.029 mg/L
r = 1.0000
Calculated Conc = -0.002 5.090
Residuals = 0.002 0.000

Abs = 0.12105 x C

5 ppm Cu	5.007	0.2	0.6051
Readings			
	0.6005	0.6052	0.6047
	0.6055	0.6076	0.6064
		0.6079	0.6042
			0.6079
			1/30/2025 10:48:32 AM



Down height 0 (mm)
Pump speed Medium

Key to tube colors
● Sample
● Calibration
● Calibration/QC
● Sample/QC
● Not Assigned

Sampler Offline

Goto Tube

Back 1
Type 1

Goto Tube

Align Probe

Rinse

Stop Rinse

Park

Optimization: Lamp
HC Lamp 1.30
1.00
0.50
0.00
0.917
Optimize Lamp
Optimize Sign
Rescale
Inst Zero
Gain 49 %
Ok

Sensitivity Check 1.5 mg/L gives about 0.2 Abs at 324.8 nm, A/A burner

เอกสารไม่ควบคุม

เอกสารไม่ควบคุม

List of Instrument Certificates for Environmental Quality Analysis

No.	Instrument/Equipment	Parameter	Manufacturer	Model/Serial No.	Calibrator	Certification No.	Date of Calibration	Due date of Calibration*
1	Cooled Incubator	TOTAL COLIFORM BACTERIA	Binder	KB400 / WTB20200000015535	National Food Institute, Ministry of Industry, Thailand	2502229-006-01	19/3/2025	18/3/2026
2	SCT Meter	CONDUCTIVITY (umhos/cm)	YSI Environmental	Pro 30 / 17A102921	Technology Promotion Association (Thailand-Japan)	24CH1158	18/9/2024	16/9/2025
3	UV-VIS Spectrophotometer	NITRATE NITROGEN	Hitachi	U-2900 / 21E22-009	DQE Services Co.,Ltd.	SP25-001	3/1/2025	2/1/2026
4	UV/VIS Spectrophotometer	AMMONIA-NITROGEN	Hitachi	U-5100 / 23A4-008	DQE Services Co.,Ltd.	SP24-028	11/9/2024	9/9/2025

Due Date of Calibration* : Based on the annual calibration plan. At least 1 time per year.

Calibration Certificate

Certificate No.: 2502229-006-01
Client name: UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.
Address: 3 Soi Udomsuk 41, Sukhumvit Road,
Bangchack, Prakhonong, Bangkok 10260

Page 1 of 3

Equipment: CHAMBER (Incubator)
Manufacturer: BINDER
Model: KB 400
Serial No.: 20200000015535
ID No.: UAE.MIC.018/2564
Order No.: 2502229
Operation No.: 2502229-006
Date of Receipt: 19 March 2025
Date of Calibration: 19 March 2025

Calibrated by Mr.Jerawut Prapawuttipong Scientist
Approved by (Mr.Pheraphat Tuanjit) (for)
Manager, Division of Calibration Laboratory
Responsible for the Technical Management Team
Date of Issue: 25 March 2025

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

เอกสารไม่ควบคุม



Calibration Report

Certificate No.: 2502229-006-01
Equipment: CHAMBER (Incubator)
Model: KB 400 Serial No.: 20200000015535
Resolution: 0.1 °C ID No.: UAE.MIC.018/2564
Manufacturer: BINDER

Date of Calibration: 19 March 2025

Page 2 of 3

Location: LABORATORY, UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.
Environment Condition:
Ambient Temperature (18 ± 1) °C
Relative Humidity (50 ± 5) %
Line Voltage (223 ± 3) Volt

Condition of this results of Calibration:

- This instrument was calibrated by insert 13 standard thermometer into its chamber and calibration according to W-TE-014 Based on TLAS G-20-1/02-08 (E): Guidelines for Calibration and Checks of Temperature Controlled Enclosures.
- The temperature scale used was based on ITS - 90.
- All data show below were final values and the initial data may be obtained upon request.

2. Reference Standard Instrument :

Instrument	Model	Serial No./ID No.	Certificate No.	Due Date	Through
Digital Thermometer with sensor	34972A	MY49016851	TE 670477-01	4 May 2025	NATIONAL FOOD INSTITUTE
RTD	CH201-303 / RTD201-303				

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

UUC Description :

Time of Record I Hour 9 Minute At 35.0 °C

Fresh air Damper
- Open Position
X Close Fan
- Not Available

- Result of Calibration : ☒ Without adjustment ☐ After adjustment

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

เอกสารไม่ควบคุม



Calibration Report

Certificate No.: 2502229-006-01
Equipment: CHAMBER (Incubator)
Model: KB 400 Serial No.: 20200000015535
Resolution: 0.1 °C ID No.: UAE.MIC.018/2564
Manufacturer: BINDER
Date of Calibration: 19 March 2025

Page 3 of 3

Calibration point: 35.0 °C

Calibration result:

Calibration Condition	Temperature (°C)	Relative Humidity (%)	Line Voltage (Volt)
MIN	17.1	45	220.0
MAX	18.1	55	225.0

Table1 : Reporting of Temperature

Calibration point (°C)	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12	#13	Uncertainty ± (°C)
35.0	34.98	35.17	34.99	34.92	35.18	35.01	35.00	35.13	35.00	34.96	35.02	35.17	35.04	0.27

Table 2 : Reporting of Characterization Result

UUC* Setting (°C)	UUC* Reading (°C)	Temperature Stability ± (°C)	Temperature Uniformity (°C)	Overall Variation (°C)
35.0	MIN 35.0 MAX 35.0 Average 35.0	0.029	0.15	0.30

Note: The quoted uncertainty include " Stability " and " Loading effect (20% of Temp Uniformity) "

UUC* = Unit Under Calibration

Stability = One-half of the greatest maximum difference of measured temperatures at any one sensors, for at least half an hour after reaching steady state.

Uniformity = The maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time.

Overall Variation = The difference of the maximum and minimum measured temperatures throughout observation time.

The report uncertainty of measurement was based on standard uncertainty multiplied by coverage factor k= 2, providing a level of confidence of approximately 95 %.

----- End -----

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

เอกสารไม่ควบคุม



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

Certificate of Calibration

Cert.No.: 24CH1158
Page: 1 of 3

Equipment : Conductivity Meter
Manufacturer : YSI
Model : Pro30
Serial No. : 17A102921
ID No. : UAE.EFM.123/2560(ENV,SCT.03/60)
Condition As-Received: Used Item
Received Date : 17 September 2024
Calibration Date : 18 September 2024
Reference : 2409-0635WSC-2
Submitted by : United Analyst and Engineering Consultant Co.,Ltd.
3 Soi Udomsuk 41, Sukhumvit Road,
Bangchack, Phrakhanong, Bangkok 10260

Ambient Temperature : (25 ± 2.5) °C
Relative Humidity : (50 ± 15) %
Calibration Procedure: In -house method :
- CP-CH6 by direct measurement
with certified reference material (CRM)
- CP-CH8 by comparison with temperature standard

Calibrated by : Warakorn Lengagrakul

Approved by : Approved Signatory

() Unnopphol Harachai
() Ponpan Paipim
(✓) Saitnip Meangmal

Issue Date : 23 September 2024

The Uncertainties are for a confidence probability of approximately 95%

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



Cert.No.: 24CH1158

Page.: 2 of 3

Condition of this result of calibration**1. Reference Standard Instrument :-**

Instrument	Serial No.	ID No.	Certificate No.	Due date
1) Thermometer	9549224	130RC003	24426	24 Apr 2025
2) Ref. Std. Thermometer	2188080	130RC044	231216	10 Oct 2024

- This Certification is traceable to SI Through Technology Promotion Association (Thailand - Japan)

2. Certified Reference Materials :-

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

Conductivity Solution	Manufacturer	Lot No.	Exp. date
1412.9 μ S/cm	CPA Chem	1005307	15 June 2025
12.880 mS/cm	CPA Chem	940112	02 Nov 2024

- Control Conductivity calibration solution temperature by Water bath (25 ± 0.1) °C

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

Calibration results**Function : Conductivity Measurement**(*) After Adjustment at 1412.9 μ S/cm

Conductivity Electrode Serial No.: 17A100315

Standard Conductivity Solution	Before Adjustment UUC* Reading	After Adjustment UUC* Reading	Uncertainty of Measurement (\pm)	Coverage factor k
1412.9 μ S/cm	1317 μ S/cm	1414 μ S/cm	9.2 μ S/cm	2.00
12.880 mS/cm	10.60 mS/cm	11.99 mS/cm	0.086 mS/cm	2.00

Remark : - UUC* = Unit Under Calibration

Cert.No.: 24CH1158

Page.: 3 of 3

Calibration Results**Function : Temperature Measurement**

This equipment was connected with Temperature Probe;

- Model :	PRO 30 COND-T
- Serial No. :	17A100315

Dimension of probe;

- Length :	95 mm
- Diameter :	2.5 mm
- Immersion Depth :	90 mm

Calibration Result : Without adjustment

Calibration Point (°C)	Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	Uncertainty of Measurement (\pm °C)	Coverage factor k
25.0	25.003	24.7	-0.303	0.13	2.00
30.0	30.002	29.7	-0.302	0.13	2.00
35.0	35.002	34.7	-0.302	0.13	2.00

Remark : - UUC* = Unit Under CalibrationThe reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor k , providing a level of confidence of approximately 95 %.

-000-

DQE Services Co., Ltd.



32 Soi Ladprao-Wanghin 55, Ladprao-Wanghin Rd., Ladprao, Ladprao, Bangkok 10230

Phone : +66 (0)2 538 2054, Email : dqeservicesinfo@gmail.com

**CERTIFICATE OF CALIBRATION**

Certificate No. : SP25-001

Page 1 of 5

Customer : United Analyst and Engineering Consultant Co., Ltd. (Head Office)

Address : 3 Soi Udomsuk 41, Sukhumvit Road, Bangchak, Phrakhanong, Bangkok 10260

Location of calibration : Laboratory 213

Equipment : UV-Vis Spectrophotometer

Manufacturer : Hitachi

Model : U-2900

Serial No. : 21E22-009

ID No. : UAE.WAT.051/2564

Received Date : 3 January 2025

Calibration Date : 3 January 2025

Issue Date : 8 January 2025

Condition Instrument : Good

Calibrated by :

(Mr. Tanawat Rittidach)

Technical Manager

Approved by :

(Ms. Chonthicha Sangngern)

Quality Manager

The calibration result is applied only to the above calibrated item and was found accurate as shown on date and place of calibration only.

The measurement capability of the laboratory and its traceability to recognized national standards and to the unit of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written consent of DQE Services Co., Ltd.

เอกสารไม่ควบคุม

FM-708-02 R01 1/11/2021

DQE Services Co., Ltd.



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Phone : +66 (0)2 538 2054, Email : dqeservicesinfo@gmail.com

**REPORT OF CALIBRATION**

Certificate No. : SP25-001

Page 2 of 5

Environment Condition : Ambient Temperature 25 ± 5 °CRelative humidity 55 ± 20 %RH

Calibration method : In-house method CP-01 Based on ASTM E275-08

Certified Reference Materials :

Material	Serial No.	Certificate No.	Due date
Absorbance Standard set	25760	115663	25 October 2025
Absorbance Standard set	25757	115638	25 October 2025
Wavelength Standard set	25806	115657	25 October 2025
Wavelength Standard set	25758	115665	25 October 2025

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

Institute of Standards and Technology (NIST) through Starna Scientific Limited

Spectral Band Width of UUC : 1.5 nm.

Scan Speed of UUC : 200 nm/min

Scan Interval of UUC : 0.1 nm.


Resolution of UUC : Photometric 0.001 Abs.

Wavelength 0.1 nm.

เอกสารไม่ควบคุม

FM-708-02 R01 1/11/2021

DQE Services Co.,Ltd.
32 Soi Ladprao-Wanghin 55, Ladprao-Wanghin Rd., Ladprao, Bangkok 10230
Phone : +66 (0)2 538 2054, Email : dqeservicesinfo@gmail.com


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REPORT OF CALIBRATION

Certificate No. : SP25-001Page 3 of 5

Calibration Results : Without adjustment


Photometric Accuracy :

Wavelength (nm.)	CRMs Values (Abs)	UUC Reading (Abs)	Correction (Abs)	Uncertainty (Abs)	Coverage factor k
420	0.0000	0.000	0.0000	0.0028	2.00
	0.5780	0.578	0.0000	0.0031	2.00
	1.0484	1.045	0.0034	0.0029	2.00
	2.1876	2.192	-0.0044	0.0075	2.00
440	0.0000	0.000	0.0000	0.0028	2.00
	0.5595	0.560	-0.0005	0.0034	2.00
	1.0239	1.023	0.0009	0.0035	2.00
	2.1230	2.125	-0.0020	0.0079	2.00
465	0.0000	0.000	0.0000	0.0028	2.00
	0.5230	0.521	0.0020	0.0030	2.00
	0.9633	0.961	0.0023	0.0029	2.00
	1.9753	1.977	-0.0017	0.0070	2.00
546.1	0.0000	0.000	0.0000	0.0028	2.00
	0.5181	0.518	0.0001	0.0031	2.00
	1.0002	0.998	0.0022	0.0033	2.00
	1.9973	1.993	0.0043	0.0084	2.00
590	0.0000	0.000	0.0000	0.0028	2.00
	0.5517	0.552	-0.0003	0.0030	2.00
	1.0803	1.079	0.0013	0.0030	2.00
	2.0373	2.032	0.0053	0.0079	2.00
635	0.0000	0.000	0.0000	0.0028	2.00
	0.5591	0.559	0.0001	0.0031	2.00
	1.0518	1.050	0.0018	0.0030	2.00
	1.9274	1.923	0.0044	0.0079	2.00

เอกสารไม่ควบคุม

FM-708-02 R01 1/11/2021

DQE Services Co.,Ltd.
32 Soi Ladprao-Wanghin 55, Ladprao-Wanghin Rd., Ladprao, Bangkok 10230
Phone : +66 (0)2 538 2054, Email : dqeservicesinfo@gmail.com


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REPORT OF CALIBRATION

Certificate No. : SP25-001Page 4 of 5


Photometric Accuracy :

Wavelength (nm.)	CRMs Values (Abs)	UUC Reading (Abs)	Correction (Abs)	Uncertainty (Abs)	Coverage factor k
235	0.0000	0.000	0.0000	0.0050	2.00
	0.7469	0.744	0.0029	0.0057	2.00
257	0.0000	0.000	0.0000	0.0050	2.00
	0.8674	0.863	0.0044	0.0059	2.00
313	0.0000	0.000	0.0000	0.0050	2.00
	0.2919	0.290	0.0019	0.0051	2.00
350	0.0000	0.000	0.0000	0.0050	2.00
	0.6430	0.640	0.0030	0.0055	2.00

เอกสารไม่ควบคุม

FM-708-02 R01 1/11/2021

DQE Services Co.,Ltd.
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Phone : +66 (0)2 538 2054, Email : dqeservicesinfo@gmail.com


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REPORT OF CALIBRATION

Certificate No. : SP25-001Page 5 of 5


Wavelength Accuracy :

CRMs Values (nm.)	UUC Reading (nm.)	Correction (nm.)	Uncertainty (nm.)	Coverage factor k
241.72	241.1	0.62	0.18	2.00
279.45	279.0	0.45	0.18	2.00
287.81	287.3	0.51	0.18	2.00
334.06	333.8	0.26	0.18	2.00
360.93	360.6	0.33	0.18	2.00
418.59	418.2	0.39	0.18	2.00
445.94	445.5	0.44	0.18	2.00
453.66	453.4	0.26	0.18	2.00
460.02	459.8	0.22	0.18	2.00
536.59	536.6	-0.01	0.18	2.00
637.98	637.7	0.28	0.18	2.00
431.38	431.1	0.28	0.18	2.00
472.50	472.3	0.20	0.18	2.00
513.47	513.4	0.07	0.18	2.00
528.88	528.9	-0.02	0.18	2.00
573.17	573.3	-0.13	0.18	2.00
585.35	585.1	0.25	0.20	2.00
684.40	684.5	-0.10	0.18	2.00
740.72	741.0	-0.28	0.20	2.00
748.55	748.8	-0.25	0.18	2.00
807.03	807.3	-0.27	0.18	2.00
879.28	879.6	-0.32	0.18	2.00

เอกสารไม่ควบคุม

FM-708-02 R01 1/11/2021

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Phone : +66 (0)2 538 2054, Email : dqeservicesinfo@gmail.com


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CERTIFICATE OF CALIBRATION

Certificate No. : SP24-028Page 1 of 5

Customer : United Analyst and Engineering Consultant Co.,Ltd. (Head Office)

Address : 3 Soi Udomsuk 41, Sukhumvit Road, Bangchak, Phrakhanong, Bangkok 10260

Location of calibration : Laboratory 315

Equipment : UV-Vis Spectrophotometer

Manufacturer : HITACHI

Model : U-5100

Serial No. : 23A4-008

ID No. : UAE.WAS.010/2567

Received Date : 10 September 2024

Calibration Date : 10 September 2024

Issue Date : 13 September 2024

Condition Instrument : Good

Calibrated by : (Mr.Tanawat Rittidach)

Approved by : (Ms.Chonthicha Sangern)

Technical Manager

Quality Manager

The calibration result is applied only to the above calibrated item and was found accurate as shown on date and place of calibration only.

The measurement capability of the laboratory and its traceability to recognized national standards and to the unit 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 DQE Services Co., Ltd.

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Environment Condition : Ambient Temperature 25 ± 5 °C

Relative humidity 55 ± 20 %RH

Calibration method : In-house method CP-01 Based on ASTM E275-08

Certified Reference Materials :

Material	Serial No.	Certificate No.	Due date
Absorbance Standard set	25760	115663	25 October 2025
Absorbance Standard set	25757	115638	25 October 2025
Wavelength Standard set	25806	115657	25 October 2025
Wavelength Standard set	25758	115665	25 October 2025

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

Institute of Standards and Technology (NIST) through Sarna Scientific Limited

Spectral Band Width of UUC : 5.0 nm.

Scan Speed of UUC : 40

Scan Interval of UUC : 0.1 nm.

Resolution of UUC : Photometric 0.001 Abs.

Wavelength 0.1 nm.

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Calibration Results : Without adjustment

Photometric Accuracy :

Wavelength (nm.)	CRMs Values (Abs)	UUC Reading (Abs)	Correction (Abs)	Uncertainty (Abs)	Coverage factor <i>k</i>
420	0.0000	0.000	0.0000	0.0028	2.00
	0.5780	0.575	0.0030	0.0031	2.00
	1.0484	1.044	0.0044	0.0029	2.00
	2.1876	2.190	-0.0024	0.0075	2.00
440	0.0000	0.000	0.0000	0.0028	2.00
	0.5595	0.557	0.0025	0.0034	2.00
	1.0239	1.021	0.0029	0.0035	2.00
	2.1230	2.121	0.0020	0.0079	2.00
465	0.0000	0.000	0.0000	0.0028	2.00
	0.5230	0.519	0.0040	0.0029	2.00
	0.9633	0.961	0.0023	0.0028	2.00
	1.9753	1.975	0.0003	0.0070	2.00
546.1	0.0000	0.000	0.0000	0.0028	2.00
	0.5181	0.515	0.0031	0.0031	2.00
	1.0002	0.997	0.0032	0.0033	2.00
	1.9973	1.996	0.0013	0.0085	2.00
590	0.0000	0.000	0.0000	0.0028	2.00
	0.5517	0.549	0.0027	0.0030	2.00
	1.0803	1.078	0.0023	0.0029	2.00
	2.0373	2.031	0.0063	0.0081	2.00
635	0.0000	0.000	0.0000	0.0028	2.00
	0.5591	0.557	0.0021	0.0031	2.00
	1.0518	1.049	0.0028	0.0029	2.00
	1.9274	1.923	0.0044	0.0080	2.00

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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	0.000	0.0000	0.0050	2.00
	0.7469	0.743	0.0039	0.0056	2.00
257	0.0000	0.000	0.0000	0.0050	2.00
	0.8674	0.862	0.0054	0.0059	2.00
313	0.0000	0.000	0.0000	0.0050	2.00
	0.2919	0.291	0.0009	0.0051	2.00
350	0.0000	0.000	0.0000	0.0050	2.00
	0.6430	0.639	0.0040	0.0055	2.00

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Wavelength Accuracy :

CRMs Values	UUC Reading	Correction	Uncertainty	Coverage factor
(nm.)	(nm.)	(nm.)	(nm.)	k
241.00	240.4	0.60	0.18	2.00
279.30	278.7	0.60	0.18	2.00
288.90	288.5	0.40	0.18	2.00
334.50	334.2	0.30	0.18	2.00
361.40	361.1	0.30	0.18	2.00
418.40	418.0	0.40	0.18	2.00
447.20	446.7	0.50	0.18	2.00
459.30	459.6	-0.30	0.18	2.00
537.00	536.6	0.40	0.18	2.00
638.00	637.4	0.60	0.18	2.00
441.29	440.8	0.49	0.18	2.00
479.88	479.6	0.28	0.18	2.00
513.75	513.5	0.25	0.18	2.00
528.59	528.6	-0.01	0.18	2.00
575.10	574.9	0.20	0.18	2.00
585.56	585.3	0.26	0.20	2.00
684.70	684.1	0.60	0.18	2.00
740.51	740.0	0.51	0.20	2.00
747.61	747.2	0.41	0.18	2.00
807.04	806.3	0.74	0.18	2.00
879.68	878.9	0.78	0.18	2.00

Remark : - UOC = 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%

- End of Certificate -

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List of Instrument Certificates for Environmental Quality Analysis

No.	Instrument/Equipment	Parameter	Manufacturer	Model/Serial No.	Calibrator	Certification No.	Date of Calibration	Due date of Calibration*
1	Atomic Absorption Spectrometer	IRON	Agilent Technologies	AA240FS / MY13160001	Agilent Technologies (Thailand) Co.,Ltd.	Preventive Maintenance Checklist	30/1/2025	29/1/2026
2	Analytical Balance	TOTAL SOLIDS	Mettler Toledo	XSR205DU / C210685394	National Food Institute,Ministry of Industry, Thailand	2502226-002-01	20/3/2025	19/3/2026
3	Mercury Analyzer	MERCURY	NIC. Japan	RA-4500 / 17780278	Coax Group Corporation Ltd.	Preventive Maintenance Report	9/7/2024	8/7/2025
4	Cooled Incubator	TOTAL COLIFORM BACTERIA	Binder	KB400 / WTB20200000015535	National Food Institute, Ministry of Industry, Thailand	2502229-006-01	19/3/2025	18/3/2026
5	Incubator	FECAL COLIFORM BACTERIA	Binder	KB400 / 20220000022479	Technology Promotion Association (THAILAND-JAPAN)	24TM938	9/7/2024	8/7/2025
6	Inductively Coupled Plasma- Optical Emission Spectrometer(ICP-OES)	MAGNESIUM	Agilent Technologies, USA	5110 VDV(G8015AA) / MY8030001	Agilent Technologies (Thailand) Co.,Ltd.	Preventive Maintenance Checklist	4/11/2024	3/11/2025
7	UV-VIS Spectrophotometer	FLUORIDE SULPHATE	Hitachi	U-2900 / 21E22-009	DQE Services Co.,Ltd.	SP25-001	3/1/2025	2/1/2026
8	Turbidity Meter (Portable)	TURBIDITY (NTU)	Oakton Instruments(China)	T100IR / 1120501017	Technology Promotion Association (Thailand-Japan)	24CH1115	6/9/2024	5/9/2025
9	Water Bath	FECAL COLIFORM BACTERIA	Memmert	WNE 14 / L414.1407	Technology Promotion Association (Thailand-Japan)	25TM501	19/3/2025	18/3/2026

Due Date of Calibration* : Based on the annual calibration plan. At least 1 time per year.

Agilent 55 240 280 Series Atomic Absorption Spectroscopy Systems

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. This checklist will be completed at the end of the service and provided to you as a record of the installation.

Note: While non-current production AA instrument and/or accessory models are not covered specifically in this document it can be used as a basic reference.

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

Introduction

Customer Information

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

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Important Customer Web Links

- For more information about Agilent Technologies services, please visit our website using the following URL: <http://www.agilent.com/en-us/products/crosslab-instrument-services/service-repair>
- To access Agilent University, visit <http://www.agilent.com/crosslab/university/> to learn about training options, which include online, classroom and onsite delivery. A training specialist can work directly with you to help determine your best options.
- A useful Agilent Resource Center web page is available, which includes short videos on maintenance, quick lists of consumables for new instruments, and other valuable information. Check out the Resource Page here: <https://www.agilent.com/en-us/agilentresources>
- Need technical support, FAQs, supplies? – visit our Support Home page at <http://www.agilent.com/search/support>
- Get answers. Share insights. Build connections. Join the Agilent Community at <https://community.agilent.com/welcome>

Service Engineer's Responsibilities

- Contact the customer and ensure that all necessary supplies are available before the preventive maintenance visit.
 - Confirm the ability of the instrument to deliver continued safe operation as established via the Agilent AA safe operation flow chart. (Refer directly to the AA 55/240/280 Preventive Maintenance Scope of Work to make this decision.)
 - Only select those pages that relate to the system or module being serviced.
 - Complete empty fields with the relevant information.
 - Complete the relevant checkboxes in the checklist using either a "X" or tick mark "✓".
 - Check "Section not applicable" check boxes to indicate services/tasks not delivered, as appropriate.
 - Complete the Preventive Maintenance service in the order of the tasks listed.
 - Complete the Service Review section together with the customer.
 - Complete the fields for page numbers at the foot of each selected page
 - Complete the total number of pages field in the Service Completion section
 - Ask the customer to sign the Service Completion section including the customer's and your signature.
- This information is subject to change without notice.

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Instrument Maintenance

System Information

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

Instrument System Name and ID	240 FS AAS
Instrument System Site and Location	United Analyst and Engineering Consultant

List System Component Product Numbers	List the Serial Numbers of each Component
1. G 9432 A	M 13160001
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	

Preparation, Safe operation and Initial performance checks

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- ☐ Agilent AA safe operation flow chart inspections (to determine if the PM can be performed).

NOTE: If by following the flow chart the instrument is deemed to be unsafe for continued use you MUST NOT continue PM work. Inform the customer immediately of the Agilent recommendation that use of the instrument be discontinued.

- ☒ Discuss any specific issues with the customer before starting.
- ☐ For HF application systems, if standard sample introduction system was not installed, ask the customer to install it. 119
- ☒ Review the instrument logbook for recorded problems and comments.
- ☒ Save instrument control settings before starting the procedure.
- ☒ Perform a general inspection of the system for cleanliness.
- ☒ Check for proper installation of parts, assemblies, sensors etc.
- ☒ Check system for required installation of components, settings as defined by current Service Notes
- ☒ Check for required firmware updates and verify with customers if they would like them installed.
- ☒ Use SVD to perform a Full Wavelength Scan for Cu HCL - "As found test_1"
- ☒ Perform a Basic Cu ABS test - "As found test_2"
- ☒ Print the Details page or screen captures of the test results and attach to the end of this checklist.

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Preventive Maintenance Procedures

FLAME SYSTEM section

☐ Section not applicable

Electronic components

- ☒ Review and confirm instrument configuration data in SVD
- ☒ Confirm power supply voltages using the *SVD Power Supply diagnostic*.
- ☒ For Dual Beam Instruments - Confirm RBC frequency using the *SVD RBC frequency diagnostic*.

Mechanical components

- ☒ Check the burner adjuster controls for complete and free movement. If the burner adjuster needs lubrication, use Molykote 321 or mineral-based molybdenum disulphide grease.
- ☒ Run SVD tests to exercise all motor drives over the full range of their travel:
 - ☒ Monochromator drive
 - ☒ Slit drive
 - ☒ Lamp selector
 - ☐ ABA

Optics components

- ☒ Check that external optical surfaces are clean – Clean or replace as required.
- ☒ Use SVD and perform *Mono Wavelength Correction*.
- ☒ Use SVD and perform *Slit Calibration*.
- ☒ Use SVD and perform *Grating Squareness Diagnostic*.
- ☒ Use SVD and perform *Zero Order Offset/Mono Correction*.
- ☒ Use SVD and perform *Wavelength Repeatability*.
- ☒ Physically inspect selected HC lamps (customer to supply per their choice) and measure the % Gain for each lamp. Advise customer if lamps are showing emission degradation due to age.
- ☒ Check that the signal energy of the D2 and HC lamps track properly. Advise customer if their D2 lamp is showing emission degradation due to age.

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Sample Introduction and Atomization

- ☒ Inspect the burner interlock plate to ensure that the interlock pin is secure and correct for the burner type.
- ☒ Clean the burner slot with a clean white card.
- ☒ Check the uniformity of the slot width.
- ☒ Clean the burner if required.
- ☒ Change the burner o-ring.
- ☒ Clean the nebulizer, spray chamber and liquid trap.
- ☒ Change all o-rings and seals in the nebulizer, nebulizer block and spray chamber.
- ☒ Check that the pressure relief bung releases readily.
- ☒ Change o-rings on the fuel and oxidant delivery barbs.
- ☒ Leave the liquid trap EMPTY and verify the flame will not ignite in this state.
- ☒ Refill liquid trap and check that overflow drains freely into the drain/waste tube.
- ☒ Check the drain/waste tube for good drainage. It should not have tight bends, kinks or loops and the lower end must be above the liquid level in the waste vessel.
- ☒ Check and clean the igniter electrode.

Gas handling components and safety interlocks

- ☒ Pressure test for leaks
- ☒ Leak test gasbox internal components and connections
- ☒ Check safety interlock status and operation using the *SVD Interlock monitoring diagnostic*.

Analytical performance for Flame systems

- ☒ Ignite a flame.
- ☒ Check that you can adjust the nebulizer uptake rate from 4 to 6.5 mL per minute.
- ☒ Optimize the instrument ready to perform Cu sensitivity test.
- ☒ Create a manual method to perform a Basic Cu ABS test - "Final Performance Testing"
- ☒ Run a PM completed sensitivity test for a 5 ppm copper sample and record the results in the AA PM Performance test results and measurements table.

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FURNACE SYSTEM section

☒ Section not applicable

Electronic components

- ☐ Review and confirm instrument configuration data in SVD
- ☐ Confirm power supply voltages using the *SVD Power Supply diagnostic*.

Mechanical components

- ☐ Run SVD tests to exercise all motor drives over the full range of their travel:
 - ☐ Monochromator drive
 - ☐ Slit drive
 - ☐ Lamp selector

Optics components

- ☐ Check that external optical surfaces are clean – Clean or replace as required.
- ☐ Use SVD and perform *Mono Wavelength Correction*.
- ☐ Use SVD and perform *Slit Calibration*.
- ☐ Use SVD and perform *Grating Squareness Diagnostic*.
- ☐ Use SVD and perform *Zero Order Offset/Mono Correction*.
- ☐ Use SVD and perform *Wavelength Repeatability*.
- ☐ Physically inspect selected HC lamps (customer to supply per their choice) and measure the % Gain for each lamp. Advise customer if lamps are showing emission degradation due to age.

Gas handling, water system and workhead component checks

- ☐ Inspect the GTA workhead gas hoses and connections for leaks.
- ☐ Pressure test for gas leaks
- ☐ If the cooler system is accessible (stand-alone) check for correct operation and coolant/water level – this includes any temperature and pressure settings plus filter cleaning (air flow and water).
- ☐ Inspect the GTA workhead water hoses and connections for leaks.
- ☐ Check all graphite components and replace if necessary.

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- ☐ Tube
- ☐ Electrodes
- ☐ Shroud

- ☐ Check and clean the end windows on the workhead.
- ☐ Check safety interlock operation.

Analytical performance for Furnace systems

- ☐ Optimize the instrument ready to perform Cu sensitivity test.
- ☐ Run the sensitivity test for a 25 ppb copper sample and record the results in the results table.

PSD autosampler accessory for Furnace systems

☒ Section NOT Applicable

- ☐ Check condition of the PSD capillary – replace if necessary
- ☐ Check condition and operation of PSD syringe – ensure it does not have air locks and bubbles.
- ☐ Change PSD rinse bottle o-ring.
- ☐ Check and clean the rinse vessel.
- ☐ Check the drain tube for good drainage. It should not have tight bends, kinks or loops and the lower end must be above the liquid level in the waste vessel.
- ☐ Ensure that the waste vessel is suitable for use with the furnace system.

Sample introduction pump system (SIPS) accessory

☒ Section NOT Applicable

- ☐ Re-torque screws securing the hubs, presser arms and pump rotors.
- ☐ Adjust each roller so that it rotates freely.
- ☐ Wipe clean the pump rotor rollers and pump bands with a dry clean cloth.
- ☐ Ensure that the presser arms and the surfaces near the pump are free from dirt and spills.
- ☐ Remove the pump module rear cover and check for the incursion of liquids and any signs of corrosion.
- ☐ Re-torque the nuts that fasten the motor mounting plates to the chassis.
- ☐ Check clips securing the diluents holder and replace if necessary.
- ☐ Disconnect, clean T-piece, and reassemble the tubing using the following steps.

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- ☐ Remove the T-piece by disconnecting the pump tubes, the pump bands and all other tubing.
- ☐ Place the T-piece in an ultrasonic bath containing strong detergent 1-5% Decon 30 or similar, for approximately 5-10 minutes.
- ☐ Wash the T-piece under a tap with a strong flow of water.
- ☐ Rinse with distilled water through all of the inlets in the reverse direction to normal sample flow.
- ☐ Reassemble.

Sample preparation system (SPS 4) accessory

☒ Section NOT Applicable

The Agilent SPS 4 autosampler is designed to need minimal maintenance.

The following maintenance requirements are suggested to maintain the performance of the autosampler.

- ☐ Cleaning the spill tray, rack location mat, end frames and chassis accessories with a damp soft cloth and diluted mild detergent.
- ☐ Cleaning the autosampler cover panels with domestic window cleaner.
- ☐ Checking 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 edge or damaged connectors.

NOTE: The autosampler requires no extra lubrication throughout its lifetime.

For further details refer to the SPS 4 service manual G8410-90050.

Sample preparation system (SPS 3) accessory

☒ Section NOT Applicable

- ☐ Check the x-axis and z-axis timing belts – Replace if there is any cracks, splits or color deterioration and belt tension.
- ☐ Check belt tensions - adjust if required
- ☐ Check the lubrication pad for single x-axis shaft. If pad is dry or customer has observed any vibration or erratic movements of the x-axis carriage, add 1 mL of Dow Corning 200 @ Fluid, 200 CS into the well.
- ☐ Check the auto-sampler ability to find tube positions - Calibrate if required.
- ☐ Clean the exterior surfaces of the accessory with soft lint free cloth. This cloth can be dampened with warm water or a mild detergent. Do not use organic solvents or abrasive cleaning agents.

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Vapor generation accessory VGA (hydride generator)

☒ Section NOT Applicable

- ☐ Inspect VGA gas supply hose.
- ☐ Inspect/replace VGA pump tubing.
- ☐ Check low gas pressure interlock setting – adjust if required.
- ☐ Check precision orifice gas flow setting – adjust if required.
- ☐ Check gas regulator pressure to 46 psi (325 kPa) – adjust if required.
- ☐ Clean the exterior surfaces of the accessory with soft lint free cloth. This cloth can be dampened with warm water or a mild detergent. Do not use organic solvents or abrasive cleaning agents.

UltrAA lamp accessory (external)

☒ Section NOT Applicable

- ☐ Check the condition of the power cable.
- ☐ Clean the exterior surfaces of the accessory with soft lint free cloth. This cloth can be dampened with warm water or a mild detergent. Do not use organic solvents or abrasive cleaning agents.

Restore System

- ☐ If you have altered the customer's instrumentation during the course of PM, restore to the original status to allow the customer to conduct their normal activities (e.g., reload the customer's method.)

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.

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Signature Page

Service Review

- ☒ Attach available reports/printouts of all tests to this documentation.
- ☒ Record the Preventive Maintenance service activity in the customer's records/logbook.
- ☒ Update/reset instrument maintenance counters as appropriate.
- ☒ Affix the PM sticker to the system or instrument logbook based on the customer's request.
- ☒ Complete the Service Engineer Comments section if there are additional comments.
- ☒ Review this service, parts replaced, and test results obtained with the customer.
- ☒ If the instrument firmware was updated, record the details of the change in the Service Engineer's Comments box or if necessary, in the customer's IQ records.

Test Results

Test Description	Expected Test Result	Actual Test Result
Flame optics PMT Gain test		
For copper at 324.8 nm, 4 mA, 0.5 nm slit width	< 55 %	49 %
Flame performance test with 5 ppm copper sample		
Air /acetylene, mixing paddle removed	Abs value > 0.5	0.5599
Air /acetylene, mixing paddle installed, 10 replicates	%RSD < 1.0	0.2 %
Deuterium furnace optics PMT Gain test		
For copper at 324.8 nm, 4 mA, 0.5 nm slit width	< 55 %	-
Deuterium furnace performance test with 25 ppb copper sample (324.8 nm)		
Precision %RSD	≤ 4.0%	-
Abs value	≥ 0.10	-
Zeeman furnace analytical performance: 25 ppb copper sample (327.4 nm)		
Precision %RSD	≤ 4.0%	-
Abs value	≥ 0.10	-
MSRP%	≥ 70 %	-

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AA consumable and parts list table

Part Description	Part Number	Product/Model # where used	PM supplied or Consumable	Instrument-Type
Test Solution – Cu 5ppm solution	6610030100	50 55 140 240 280	PM supplied	Common
Test Solution - Blank solution	5190-7001	50 55 140 240 280	PM supplied	Common
Copper, 1000 ug/ml, 100ml	5190-8279	50 55 140 240 280	*	Common
Kit, Mk 7 O-rings, aqueous, complete set	9910093400	50 55 140 240 280	PM supplied	Flame
Organic Kit	9910093500	50 55 140 240 280	PM supplied	Flame
Wire Nebulizer Cleaning	9910024700	50 55 140 240 280	consumable	Flame
Tubing-Capillary Std Nebs	9910024800	50 55 140 240 280	consumable	Flame
Capillary Tube Hivac Neb (3) (organics only)	9910044000	50 55 140 240 280	consumable	Flame
Glass impact beads (5/pk)	9910025700	50 55 140 240 280	consumable	Flame
Teflon impact beads (5/pk): (organics only)	9910053300	50 55 140 240 280	consumable	Flame
Burner cleaning strip (100/pk)	9910053900	50 55 140 240 280	consumable	Flame
Window UV silica – round (right side)	2010082600	50 55 140 240 280	PM supplied	Common
Window UV silica – rectangular (left side)	2010082500	50 55 140 240 280	PM supplied	Common
Pad adhesive window (round)	4910012700	50 55 140 240 280	PM supplied	Common
Pad adhesive window (rectangular)	4910012800	50 55 140 240 280	PM supplied	Common
Electrode kit (1 pr) (D2)	6310003400	GTA120	PM supplied	Furnace
Shroud (D2)	6310003100	GTA120	PM supplied	Furnace
Zeeman electrode kit (1 pr)	6310003500	GTA120	PM supplied	Furnace
Zeeman shroud	6310003600	GTA120	PM supplied	Furnace
O-ring PSD rinse bottle	6910025900	PSD120	PM supplied	Furnace

* For engineers who only service AA instruments 5190-8279 can be used as a cheaper alternative for 6610030100.

Items classified as PM supplied in the above table are included in the standard PM

Those classified as consumable should be provided by the customer or charged to the customer if supplied by the Agilent service engineer.

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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.

Report ID: Diagnostic Start Time: 1/30/2025 9:14:28 AM Diagnostic End Time: 1/30/2025 9:49:08 AM
Customer: UAE Service Engineer: Kanyakorn S.
Address: Soi Udumuk 41, Sukhumvit Rd, Bangkok Contact Details: 026376363#1

Configuration:

Serial Number: MY13160001 Turret Type: Automatic
Instrument Model: Varian AA140/240/280 Number Of Lamps: 4
Flame Instrument: True Mono Type: Automatic
Furnace Instrument: True Gasbox Type: Y Gas Box
Zeeman Present: False Auto Burner Adjuster: False
Internal Zeeman: False Mains Frequency: 50
Internal UltraAA: False Firmware Version: 2.11
Optics Type: Double Beam Photomultiplier Type: Normal(900nm)
D2 BG Correction Fitted: True PWB Version: 45
Boot Block Version: 1.00

EEPROM Data:

Instrument Run Hours: 62819.180 D2 Run Hours: 53396.500
Zero Wavelength Offset: 30.133 D2 Serial Number: not set!
Mono Correction: 0.770 D2 Install Date: 1/1/1970
Flame Hours: 32411.834 D2 Original Intensity: 1.000
D2 Last Intensity: 475.000

Service Completion

Service request number: 6007549143 Date service completed: 30 Jan 2025
Agilent signature: Kanyakorn S. Customer signature: [Signature]
Total number of pages in this document: 13



เอกสารไม่ควบคุม

Frequency:

Averaging Period: 30.0
Datapoint Count: 20
Upper Limit: 51.00
Lower Limit: 49.00
Average Frequency: 50.00
Highest Measured Frequency: 50.00
Lowest Measured Frequency: 50.00
Result: **Passed**

Power Supply:

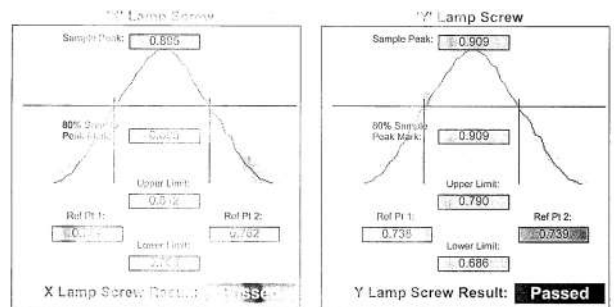
Averaging Period: 30.0
Datapoint Count: 20

	Lower Limit (V)	Actual (V)	Upper Limit (V)	Result:
12.00 V Rail	10.80	12.12	13.20	Passed
-12.00 V Rail	-13.20	-11.90	-10.80	Passed
5.00 V Rail	4.50	5.04	5.50	Passed
310.00 V Rail	279.00	320.00	341.00	Passed

Optics

Beam Balance:

Lamp Type: Copper
Lamp Socket Used: 3
Peak Selected: 324.80
Lamp Alignment: **Performed**



Grating Spectrophotometer

Lamp Element(s): Copper
Lamp Turret Position: 3
Lamp Current(mA): 4.00
Slit Width(nm): 0.5
1st Zero Wavelength(nm): 324.80
Lamp Alignment: **Performed**

	Lower Limit (nm)	Actual (nm)	Upper Limit (nm)	Result:
Zero Order	-0.10	0.00	0.10	Passed
First Order	324.05	324.75	325.15	Passed
Second Order	648.00	649.50	649.97	Passed

เอกสารไม่ควบคุม

เอกสารไม่ควบคุม

Wavelength Repeats: 2

Lamp Used: Copper
Peak Used(nm): 324.759
Connected to Socket: 3

Lamp Current(mA): 4
Slit Width(nm): 0.2
Slit Height: Normal

Lamp Alignment: 0.000

Lower Limit(nm) 324.759 Upper Limit(nm) 324.888

(High end from Zero Drive) (Low end from end)

Sample 1: 324.873 Sample 2: 324.823
Sample 3: 324.873 Sample 4: 324.823
Sample 5: 324.823 Sample 6: 324.819
Sample 7: 324.819 Sample 8: 324.819
Sample 9: 324.823 Sample 10: 324.819

Absorbance: 0.000 Standard Deviation: 0.003

Result: Passed

เอกสารไม่ควบคุม

Auto Lamp Recognition:

Lamp 1: Unloaded Lamp/Not Connected Lamp 5: Not Supported
Lamp 2: 87 - Silver Cadmium Lamp/Not Connected Lamp 6: Not Supported
Lamp 3: 14 - Copper (Cu) Lamp 7: Not Supported
Lamp 4: Unloaded Lamp/Not Connected Lamp 8: Not Supported

Result: Passed

GFA Temperature Monitoring:

Notes:

Signatures:

Signature: Kanyakorn S. 30 Jan 2025

Signature: Kanyakorn S. Date

เอกสารไม่ควบคุม

Wavelength Drive:

Slit Drive:

Turret Drive:

Auto Burner/Water Delay:

Microbalance:

Signal Processing Linking:

Calculate Acids: New Only Mode

	Lower Limit	Upper Limit	Result:
S0	114	297	Passed
S1	198	191	Passed
S2	271	332	Passed
S3	474	579	Passed
S4	936	1008	Passed
S5	1435	1754	Passed
S6	2108	3053	Passed
S7	4547	5313	Passed

Interlocks:

Burner Flame: Working
H2O Burner Flame: Working
Flame Shield Closed: Working
Gas Control Flame: Working
Pressure Release During Flame: Working
Liquid Trap Closure: Working

Flame Detect: Working
GCU Active: Working
Oxidant Pressure: Working
Oxidant Changeover: Unchecked
Ignition: Working

เอกสารไม่ควบคุม

Sequential by time report 1/30/2025 10:53 AM Page 1 of 1 SpectraA

Analyst: Sensitivity Test 01
Date Started: 1/30/2025 10:33 AM GMT: 1/30/2025 3:33 AM
Worksheet: Sensitivity Test 01
Comment: Sensitivity Test 01
Methods: Cu
Computer name: DESKTOP-R3UFRS
Serial Number: MY13160001

Method: Cu (Flame)

Sample ID	Conc. mg/L	%RSD	Mean Abs
CAL ZERO	0.000	38.8	0.0002
Readings	0.0002	0.0003	0.0001
STANDARD 1	5.000	0.1	0.5571
Readings	0.5574	0.5563	0.5575

Abs = 0.11141 x C

Curve Fit = Linear Origin
Characteristic Conc = 0.030 mg/L
r = 1.0000
Calculated Conc = 0.002 5.000
Residuals = -0.007 0.000

Abs = 0.11141 x C

5 ppm Cu	Conc. mg/L	%RSD	Mean Abs
Readings	0.5582	0.5596	0.5615

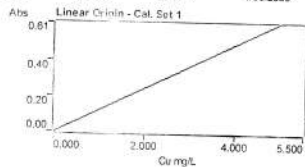
เอกสารไม่ควบคุม

Analyst:
Date Started: 1/30/2025 10:33 AM GMT: 1/30/2025 3:33 AM
Worksheet: Precision Test
Comment:
Methods: Cu
Computer name: DESKTOP-PSUFRS
Serial Number: MY13160001

Method: Cu (Flame)

Sample ID	Conc. mg/L	%RSD	Mean Abs
CAL ZERO	0.000	64.1	-0.0002
STANDARD 1	5.000	0.3	0.6052

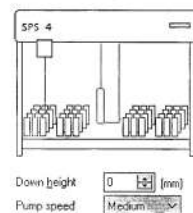
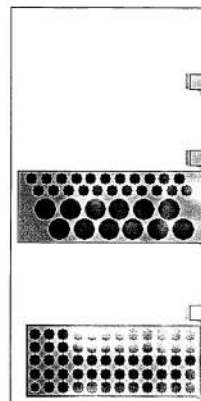
Readings: -0.0003 -0.0003 -0.0001 1/30/2025 10:46:52 AM
Readings: 0.6036 0.6073 0.6047 1/30/2025 10:47:24 AM



Curve Fit = Linear Origin
Characteristic Conc = 0.029 mg/L
r = 1.0000
Calculated Conc = -0.002 5.000
Residuals = 0.002 0.000

Abs = 0.12105 x C

5 ppm Cu	5.007	0.2	0.6051
Readings:	0.6055	0.6052	0.6047
	0.6055	0.6076	0.6064
			0.6079
			1/30/2025 10:48:32 AM



Key to tube colors

Sample

Calibration

Calibration/QC

Sample/QC

Not Assigned

Goto Tube

Back

Type

Goto Tube

Align Probe

Rinse

Store/Freeze

Park

HC Lamp

1.30

1.00

0.50

0.00

0.917

Optimize Lamp

Optimize Sign

Rescale

Inst Zero

Gain 49 %

Ok

Sensitivity Check 1.5 mg/L gives about 0.2 Abs at 324.8 nm, A/A burner

เอกสารไม่ควบคุม

เอกสารไม่ควบคุม



มูลนิธิสถาบันอาหารเพื่อการพัฒนา
ศูนย์บริการห้องปฏิบัติการอาหาร
Foundation for Industrial Development National Food Institute
Food Industrial Laboratory Service Center



Calibration Certificate

Certificate No.: 2502226-002-01
Client name: UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.
Address: 3 Soi Udumsuk 41, Sukhumvit Road,
Bangchack, Prakhnong, Bangkok 10260

Page 1 of 4

Equipment: Electronic Balance
Manufacturer: METTLER TOLEDO
Model: XSR205DU
Serial No.: C210685394
ID No.: UAE.WAO.010/2565
Order No.: 2502226
Operation No.: 2502226-002
Date of Receipt: 19 March 2025
Date of Calibration: 20 March 2025

Calibrated by Mr.Yothin Charoensuk
Scientist
Approved by Mr. N. Nigudat
(Mr.Pheraphat Tuanjit)
Manager, Division of Calibration Laboratory
Responsible for the Technical Management Team
Date of Issue: 25 March 2025

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.

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

เอกสารไม่ควบคุม



มูลนิธิสถาบันอาหารเพื่อการพัฒนา
ศูนย์บริการห้องปฏิบัติการอาหาร
Foundation for Industrial Development National Food Institute
Food Industrial Laboratory Service Center



Calibration Report

Certificate No.: 2502226-002-01
Equipment: Electronic Balance
Manufacturer: METTLER TOLEDO
Model: XSR205DU
Serial No.: C210685394
Capacity: 82 g / 220 g
Resolution: 0.00001 g / 0.0001 g
ID No.: UAE.WAO.010/2565

Page 2 of 4

Date of Calibration: 20 March 2025
Environment Condition: Ambient Temperature: 21.2 ± 0.6 °C Relative Humidity: 48 ± 3.5 %
Place of Calibration: 208 Balance Room, UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.
Condition of Equipment: Good Condition
Condition of This Results of Calibration:

Reference Standard	Model	Serial No.	Calibrated By	Certificate No.	Due Date
Standard Weight Class E2	1mg to 200g	8505567572	TCS	M24041005	19 April 2025
Instrument	Model	Serial No.	Calibrated By	Certificate No.	Due Date
Thermo-Hygro Meter	608-H1	NF18TH 017/23	Quality Reborn	QR25-0542	10 February 2026

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:

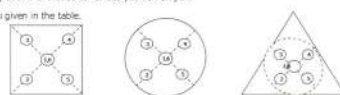
1. Repeatability of Reading:

Nominal Value (g)	Standard Deviation of Reading (g)
40	0.0000042
80	0.0000042
100	0.0000000
200	0.0000000

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)
100.0001	100.0001	100.0001	100.0001	100.0001	100.0001	0.0000

FCS-012 Revision: 01 Date: 20-04-65

เอกสารไม่ควบคุม



Calibration Report

Certificate No.: 2502226-002-01
Equipment: Electronic Balance
Model: XSR205DU
Serial No.: C210685394
Capacity: 82 g / 220 g
Manufacturer: METTLER TOLEDO
Resolution: 0.00001 g / 0.0001 g
ID No.: UAE.WAO.010/2565

Date of Calibration: 20 March 2025 Page 3 of 4

Calibration Results: (Continued)

Calibration Range: 0-80 g

Calibration Adjustment: Internal Calibration

3. Departure from Nominal Value: (Range: 0 - 82 g ; Resolution: 0.00001 g)

Nominal Value (g)	Standard Value (g)	Average Reading (g)	Correction (g)	Uncertainty (± g)	Coverage Factor K
Unload	0.000000	0.00000	0.00000	0.0000087	2.00
0.001	0.001003	0.00100	0.00000	0.0000090	2.00
0.005	0.005002	0.00501	-0.00001	0.0000092	2.00
0.01	0.010003	0.01002	-0.00002	0.0000089	2.00
0.05	0.049996	0.05001	-0.00001	0.0000096	2.00
0.1	0.100011	0.10002	-0.00001	0.000011	2.00
0.5	0.500016	0.50004	-0.00002	0.000014	2.00
1	1.000003	1.00005	-0.00005	0.000016	2.00
2	2.000023	2.00006	-0.00004	0.000017	2.00
5	5.000015	5.00006	-0.00005	0.000020	2.00
10	10.000009	10.00005	-0.00004	0.000026	2.00
20	20.000030	20.00007	-0.00004	0.000037	2.00
30	30.000039	30.00009	-0.00005	0.000050	2.00
50	50.000028	50.00008	-0.00005	0.000068	2.00
80	80.000067	80.00013	-0.00006	0.00011	2.00

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

เอกสารไม่ควบคุม เอกสารไม่ควบคุม

Calibration Report

Certificate No.: 2502226-002-01
Equipment: Electronic Balance
Model: XSR205DU
Serial No.: C210685394
Capacity: 82 g / 220 g
Manufacturer: METTLER TOLEDO
Resolution: 0.00001 g / 0.0001 g
ID No.: UAE.WAO.010/2565

Date of Calibration: 20 March 2025 Page 4 of 4

Calibration Results: (Continued)

Calibration Range: >80-200 g

Calibration Adjustment: Internal Calibration

3. Departure from Nominal Value: (Range: >80 - 200 g ; Resolution: 0.0001 g)

Nominal Value (g)	Standard Value (g)	Average Reading (g)	Correction (g)	Uncertainty (± g)	Coverage Factor K
90	90.00010	90.00002	-0.00001	0.000015	2.00
100	100.00006	100.00001	0.00006	0.000016	2.00
110	110.00007	110.00002	-0.00001	0.000017	2.00
120	120.00009	120.00002	-0.00001	0.000018	2.00
130	130.00010	130.00002	-0.00001	0.000019	2.00
140	140.00013	140.00002	-0.00001	0.000019	2.00
150	150.00009	150.00002	-0.00001	0.000021	2.00
160	160.00010	160.00002	-0.00001	0.000022	2.00
170	170.00012	170.00002	-0.00001	0.000023	2.00
200	200.00013	200.00002	-0.00001	0.000028	2.00

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

----- End -----

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

เอกสารไม่ควบคุม เอกสารไม่ควบคุม

UNITED ANALYST AND ENGINEERING CONSULTANT COMPANY Ltd.

Automatic Mercury Analyzer

Model RA-4500

Preventive Maintenance Report

Serial No. : 17780278

Soft version : Ver 2.0.7

ROM version : Ver 2.0.1

Date : 09 July 2024

PM by : Pradit Mayong
(Pradit M.)

Approved by : Kitichai S.
(Kitichai S.)



Coax Group Corporation Ltd.
1131/62,64,325-331 Nakornchaisri road,
Kwang ThanonNakornchaisri, Dusit, Bangkok 10300 Thailand
Tel. 02-2435263, 02-6682436 Fax. 02-2437386

เอกสารไม่ควบคุม

Inspection result

ITEM	STANDARD	RESULT	JUDGE
1. Self Check			
1.1 Heating		PASS	OK
1.2 Cooling		PASS	OK
1.3 Leak		PASS	OK
1.4 Optical system		PASS	OK
1.5 Drift		PASS	OK
2. Analytical curve inspection(AREA)			
2.1 No Pretreatment (Low Conc.)	Correlation coefficient (r) ≥ 0.9990	0.9999	OK
3. Repeatability(AREA)			
3.1 No Pretreatment 100ppb, n=3		1. 99.60 ppb 2. 101.84 ppb 3. 101.22 ppb C.V. ≤ 5% 1.15%	OK
4. Blank	Below 1.0 (AREA)	0.1002	OK

เอกสารไม่ควบคุม

Counter

Maintenance

MAIN

SC

Counter

Parameter

Measurement Count

2027122-06-08

Clear

P1 tube(100000)

0400mp(04-07-08)

Clear

Mercury Exhaust Filter Amount(mg)(1500mg)

1022-08-08

Clear

P2 tube(100000)

0401m(04-07-08)

Clear

Lamp Active Size(50000)

7415mg(04-07-08)

Clear

P3 tube(100000)

0400mp(04-07-08)

Clear

Microwave Filter Usage Time(2000h)

0405mg(04-07-08)

Clear

P4 tube(100000)

0400m(04-07-08)

Clear

Main Pump tube(750h)

0405mg(04-07-08)

Clear

P5 tube(100000)

0400m(04-07-08)

Clear

Heating Lamp Time

18042m(02-06-08)

Clear

P6 tube(100000)

0400m(04-07-08)

Clear

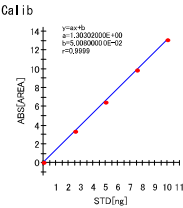
P7 tube(100000)

0400m(04-07-08)

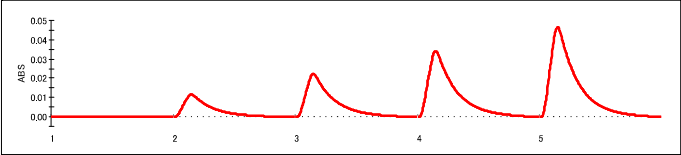
Clear

Exit

Title : Preventive Maintenance RA-4500 sn:17780278
Date : 2024-07-09
Name : Coax Group
Memo : Calibration Curve 0-10ng



STD									
No.	STD [ppb]	SVOL [mL]	CVOL [mL]	DVOL [mL]	STD [ng]	AREA [ON]	MEAS [ng]	Dev [%]	Note
1	100.000	0.000	5.000	5.000	0.000	0.0846	0.0265	-	
2	100.000	0.025	5.000	5.000	2.500	3.3464	2.5298	1.2	
3	100.000	0.050	5.000	5.000	5.000	6.4170	4.8863	2.3	
4	100.000	0.075	5.000	5.000	7.500	9.8647	7.5322	0.4	
5	100.000	0.100	5.000	5.000	10.000	13.1132	10.0253	0.3	



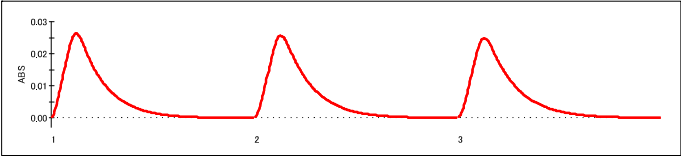
SMP								
No.	NAME	SVOL [mL]	CVOL [mL]	DVOL [mL]	AREA [ON]	MEAS [ng]	CONC [ug/L]	Note
1	100ppb	0.050	5.000	5.000	6.5389	4.9798	99.60	
2	100ppb	0.050	5.000	5.000	6.6848	5.0918	101.84	
3	100ppb	0.050	5.000	5.000	6.6446	5.0610	101.22	

Statistics				
No.	NAME	TRY	AV [ug/L]	SD [ug/L]
1	100ppb	3	100.887	1.15660

เอกสารไม่ควบคุม

-1-

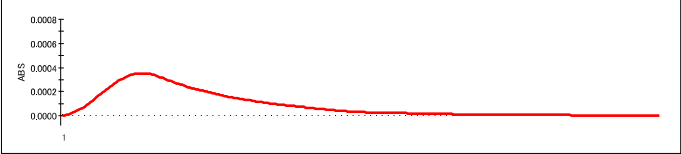
เอกสารไม่ควบคุม



Self Check
Heat check:PASS!! (26.3degC[05:00] -> 30.3degC[02:29])
Sensor check:PASS!! (53-10= 43)
Leak check:PASS!! (0.19L/min)
Sig/Ref check:PASS!! (Sig:4.00V, Ref:4.02V)
Drift check:PASS!! (0.000061 - -0.0000179 = 0.0000240)

Title : Preventive Maintenance RA-4500 sn:17780278
Date : 2024-07-09
Name : Coax Group
Memo : Blank

SMP								
No.	NAME	SVOL [mL]	CVOL [mL]	DVOL [mL]	AREA [ON]	MEAS [ng]	CONC [ug/L]	Note
1	Blank DI				0.1002	0.0385		



-2-

เอกสารไม่ควบคุม



-3-

เอกสารไม่ควบคุม



Calibration Certificate

Certificate No.: 2502229-006-01
Client name: UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.
Address: 3 Soi Udomsuk 41, Sukhumvit Road,
Bangchack, Prakhonong, Bangkok 10260

Page 1 of 3

Equipment: CHAMBER (Incubator)
Manufacturer: BINDER
Model: KB 400
Serial No.: 2020000015535
ID No.: UAE.MIC.018/2564
Order No.: 2502229
Operation No.: 2502229-006
Date of Receipt: 19 March 2025
Date of Calibration: 19 March 2025

Calibrated by Mr.Jerawut Prapawuttipong Scientist
Approved by (Mr.Pheraphat Tuanjit) (for)
Manager, Division of Calibration Laboratory
Responsible for the Technical Management Team
Date of Issue: 25 March 2025

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

เอกสารไม่ควบคุม

2008 ต.ป.ช. 36, ถนนสุขุมวิท แขวงคลองตัน เขตคลองเตย กรุงเทพมหานคร 10110
2008 Soi 36, Asoke Road, Bang Yi Khan Subdistrict, Bang Phai District, Bangkok 10110, Thailand
Tel: +66(0) 2422 8559 Fax: +66(0) 2422 8545



Calibration Report

Certificate No.: 2502229-006-01
Equipment: CHAMBER (Incubator)
Model: KB 400 Serial No.: 20200000015535
Resolution: 0.1 °C ID No.: UAE.MIC.018/2564
Manufacturer: BINDER

Date of Calibration: 19 March 2025

Page 2 of 3

Location: LABORATORY, UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.
Environment Condition:
Ambient Temperature (18 ± 1) °C
Relative Humidity (50 ± 5) %
Line Voltage (223 ± 3) Volt

Condition of this results of Calibration:

- This instrument was calibrated by insert 13 standard thermometer into its chamber and calibration according to W-TE-014 Based on TLAS G-20-1/02-08 (E): Guidelines for Calibration and Checks of Temperature Controlled Enclosures.
- The temperature scale used was based on ITS - 90.
- All data show below were final values and the initial data may be obtained upon request.

2. Reference Standard Instrument :

Instrument	Model	Serial No./ID No.	Certificate No.	Due Date	Through
Digital Thermometer with sensor	34977A	MY49016851	TE 670477-01	4 May 2025	NATIONAL FOOD INSTITUTE
RTD	CH201-303 / RTD201-303				

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

UUC Description :

Time of Record I Hour 9 Minute At 35.0 °C

Fresh air Damper - Open Position -

- X Close Fan -

- Not Available

- Result of Calibration : ☒ Without adjustment ☐ After adjustment

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

เอกสารไม่ควบคุม

2008 ต.ป.ช. 36, ถนนสุขุมวิท แขวงคลองตัน เขตคลองเตย กรุงเทพมหานคร 10110
2008 Soi 36, Asoke Road, Bang Yi Khan Subdistrict, Bang Phai District, Bangkok 10110, Thailand
Tel: +66(0) 2422 8559 Fax: +66(0) 2422 8545



Calibration Report

Certificate No.: 2502229-006-01
Equipment: CHAMBER (Incubator)
Model: KB 400 Serial No.: 20200000015535
Resolution: 0.1 °C ID No.: UAE.MIC.018/2564
Manufacturer: BINDER
Date of Calibration: 19 March 2025

Page 3 of 3

Calibration point: 35.0 °C

Calibration result:

Calibration Condition	Temperature (°C)	Relative Humidity (%)	Line Voltage (Volt)
MIN	17.1	45	220.0
MAX	18.1	55	225.0

Table1 : Reporting of Temperature

Calibration point (°C)	# 1	# 2	# 3	# 4	# 5	# 6	# 7	# 8	# 9	# 10	# 11	# 12	# 13	Uncertainty ± (°C)
35.0	34.98	35.17	34.99	34.92	35.18	35.01	35.00	35.13	35.00	34.96	35.02	35.17	35.04	0.27

Table 2 : Reporting of Characterization Result

UUC* Setting (°C)	UUC* Reading (°C)			Temperature Stability ± (°C)	Temperature Uniformity (°C)	Overall Variation (°C)
35.0	MIN	MAX	Average			
35.0	35.0	35.0	35.0	0.029	0.15	0.30

Note: The quoted uncertainty include " Stability " and " Loading effect (20% of Temp Uniformity) "

UUC* = Unit Under Calibration

Stability = One-half of the greatest maximum difference of measured temperatures at any one sensors, for at least half an hour after reaching steady state.

Uniformity = The maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time.

Overall Variation = The difference of the maximum and minimum measured temperatures throughout observation time.

The report uncertainty of measurement was based on standard uncertainty multiplied by coverage factor k= 2, providing a level of confidence of approximately 95 %.

----- End -----

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

เอกสารไม่ควบคุม

2008 ต.ป.ช. 36, ถนนสุขุมวิท แขวงคลองตัน เขตคลองเตย กรุงเทพมหานคร 10110
2008 Soi 36, Asoke Road, Bang Yi Khan Subdistrict, Bang Phai District, Bangkok 10110, Thailand
Tel: +66(0) 2422 8559 Fax: +66(0) 2422 8545



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

Certificate of Calibration

Cert. No.: 24TM938
Page : 1 of 3

Equipment : Incubator
Manufacturer : Binder
Model : KB 400 E6
Serial No. : 20220000022479
ID No. : UAE.MIC.028/2566
Submitted by : United Analyst and Engineering Consultant Co.,Ltd.
3 Soi Udomsuk 41, Sukhumvit Road,
Bangchak, Phrakhanong,
Bangkok 10260
Location : Microbiology Laboratory
Received Order : 09 July 2024
Calibration Date : 09 July 2024
Ambient Temperature : (26 ± 10) °C
Relative Humidity : (50 ± 30) %

Calibrated by : Khit Ruttanaprapachai

Approved by :

Approved Signatory

- () Ponpan Palpim
(✓) Suwit Imjai
() Kunchit Promprat

Issue Date : 19 July 2024

The Uncertainties are for a confidence probability of approximately 95%

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

เอกสารไม่ควบคุม



Equipment : Incubator
 Condition As-Received : Used Item
 Reference : 2407-0153OC-4
 Procedure Used :-

Cert. No.: 24TM938
 Page : 2 of 3

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).
 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	MY49001451	24LM44	TPA	17 Mar 2025

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

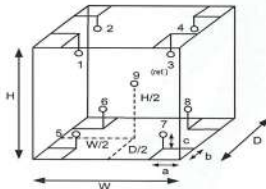
3. This certification is traceable to the International System of Unit.

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

Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source

Fresh air setting : Not Available



Environment during calibration		
	Beginning	Finished
Temp. (°C)	23	24
REL.Humid. (%)	52	54
AC Supply (Volt)	221	222

Position :	Ref. Std. ID No.:
1	19RTD-2/1
2	19RTD-2/2
3	19RTD-2/3
4	19RTD-2/4
5	19RTD-2/5
6	24-19RTD-2/6
7	19RTD-2/7
8	19RTD-2/8
9 (ref.)	19RTD-2/9

Probe Installation Details :

Dimension of Chamber :	
a = 10 cm	D = 0.47 m
b = 10 cm	W = 0.65 m
c = 10 cm	H = 1.2 m
	Capacity = 0.37 m ³

เอกสารไม่ควบคุม



Equipment : Incubator
 Condition As-Received : Used Item
 Reference : 2407-0153OC-4
 Result of Calibration :- (*) Without Adjustment
 Function of UUC* : Temperature Source
 Fresh air setting : Not Available

Cert. No.: 24TM938
 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
35.0	35.0	35.0	0.030	0.31	0.33	2

Calibration Point (°C)	Measured Temperature (°C)									Uncertainty (± °C)
	1	2	3	4	5	6	7	8	9 (ref.)	
35.0	35.093	35.011	35.081	35.118	34.840	35.054	34.924	34.978	34.824	0.30

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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เอกสารไม่ควบคุม

DQE Services Co.,Ltd.



32 Soi Ladprao-Wanghin 55, Ladprao-Wanghin Rd., Ladprao, Bangkok 10230
 Phone : +66 (0)2 538 2054, Email : dqeservicesinfo@gmail.com



CERTIFICATE OF CALIBRATION

Certificate No. : SP25-001

Page 1 of 5

Customer : United Analyst and Engineering Consultant Co.,Ltd. (Head Office)

Address : 3 Soi Udomsuk 41, Sukhumvit Road, Bangchak, Phrakhanong, Bangkok 10260

Location of calibration : Laboratory 213

Equipment : UV-Vis Spectrophotometer

Manufacturer : Hitachi

Model : U-2900

Serial No. : 21E22-009

ID No. : UAE.WAT.051/2564

Received Date : 3 January 2025

Calibration Date : 3 January 2025

Issue Date : 8 January 2025

Condition Instrument : Good

Calibrated by :

(Mr.Tanawat Rittidach)

Technical Manager

Approved by :

(Ms.Chonthicha Sangnern)

Quality Manager

The calibration result is applied only to the above calibrated item and was found accurate as shown on date and place of calibration only.

The measurement capability of the laboratory and its traceability to recognized national standards and to the unit of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written permission of DQE Services Co.,Ltd.

เอกสารไม่ควบคุม

FM-708-02 R01 1/11/2021

DQE Services Co.,Ltd.



32 Soi Ladprao-Wanghin 55, Ladprao-Wanghin Rd., Ladprao, Bangkok 10230
 Phone : +66 (0)2 538 2054, Email : dqeservicesinfo@gmail.com



REPORT OF CALIBRATION

Certificate No. : SP25-001

Page 2 of 5

Environment Condition : Ambient Temperature 25 ± 5 °C

Relative humidity 55 ± 20 %RH

Calibration method : In-house method CP-01 Based on ASTM E275-08

Certified Reference Materials :

Material	Serial No.	Certificate No.	Due date
Absorbance Standard set	25760	115663	25 October 2025
Absorbance Standard set	25757	115638	25 October 2025
Wavelength Standard set	25806	115657	25 October 2025
Wavelength Standard set	25758	115665	25 October 2025

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

Institute of Standards and Technology (NIST) through Starna Scientific Limited

Spectral Band Width of UUC : 1.5 nm.

Scan Speed of UUC : 200 nm/min

Scan Interval of UUC : 0.1 nm.

Resolution of UUC : Photometric 0.001 Abs.

Wavelength 0.1 nm.

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FM-708-02 R01 1/11/2021

REPORT OF CALIBRATION

Certificate No. : SP25-001Page 3 of 5

Calibration Results : Without adjustment

Photometric Accuracy :

Wavelength (nm.)	CRMs Values (Abs)	UUC Reading (Abs)	Correction (Abs)	Uncertainty (Abs)	Coverage factor k
420	0.0000	0.000	0.0000	0.0028	2.00
	0.5780	0.578	0.0000	0.0031	2.00
	1.0484	1.045	0.0034	0.0029	2.00
	2.1876	2.192	-0.0044	0.0075	2.00
440	0.0000	0.000	0.0000	0.0028	2.00
	0.5595	0.560	-0.0005	0.0034	2.00
	1.0239	1.023	0.0009	0.0035	2.00
	2.1230	2.125	-0.0020	0.0079	2.00
465	0.0000	0.000	0.0000	0.0028	2.00
	0.5230	0.521	0.0020	0.0030	2.00
	0.9633	0.961	0.0023	0.0029	2.00
	1.9753	1.977	-0.0017	0.0070	2.00
546.1	0.0000	0.000	0.0000	0.0028	2.00
	0.5181	0.518	0.0001	0.0031	2.00
	1.0002	0.998	0.0022	0.0033	2.00
	1.9973	1.993	0.0043	0.0084	2.00
590	0.0000	0.000	0.0000	0.0028	2.00
	0.5517	0.552	-0.0003	0.0030	2.00
	1.0803	1.079	0.0013	0.0030	2.00
	2.0373	2.032	0.0053	0.0079	2.00
635	0.0000	0.000	0.0000	0.0028	2.00
	0.5591	0.559	0.0001	0.0031	2.00
	1.0518	1.050	0.0018	0.0030	2.00
	1.9274	1.923	0.0044	0.0079	2.00

เอกสารไม่ควบคุม

FM-708-02 R01 1/11/2021

REPORT OF CALIBRATION

Certificate No. : SP25-001Page 4 of 5

Photometric Accuracy :

Wavelength (nm.)	CRMs Values (Abs)	UUC Reading (Abs)	Correction (Abs)	Uncertainty (Abs)	Coverage factor k
235	0.0000	0.000	0.0000	0.0050	2.00
	0.7469	0.744	0.0029	0.0057	2.00
257	0.0000	0.000	0.0000	0.0050	2.00
	0.8674	0.863	0.0044	0.0059	2.00
313	0.0000	0.000	0.0000	0.0050	2.00
	0.2919	0.290	0.0019	0.0051	2.00
350	0.0000	0.000	0.0000	0.0050	2.00
	0.6430	0.640	0.0030	0.0055	2.00

เอกสารไม่ควบคุม


FM-708-02 R01 1/11/2021

DQE Services Co.,Ltd.

DQE Services

32 Soi Ladprao-Wanghin 55, Ladprao-Wanghin Rd., Ladprao, Ladprao, Bangkok 10230

Phone : +66 (0)2 538 2054, Email : dqeservicesinfo@gmail.com



ISO 17025:2017
CALIBRATION DATA

REPORT OF CALIBRATION

Certificate No. : SP25-001Page 5 of 5

Wavelength Accuracy :

CRMs Values (nm.)	UUC Reading (nm.)	Correction (nm.)	Uncertainty (nm.)	Coverage factor k
241.72	241.1	0.62	0.18	2.00
279.45	279.0	0.45	0.18	2.00
287.81	287.3	0.51	0.18	2.00
334.06	333.8	0.26	0.18	2.00
360.93	360.6	0.33	0.18	2.00
418.59	418.2	0.39	0.18	2.00
445.94	445.5	0.44	0.18	2.00
453.66	453.4	0.26	0.18	2.00
460.02	459.8	0.22	0.18	2.00
536.59	536.6	-0.01	0.18	2.00
637.98	637.7	0.28	0.18	2.00
431.38	431.1	0.28	0.18	2.00
472.50	472.3	0.20	0.18	2.00
513.47	513.4	0.07	0.18	2.00
528.88	528.9	-0.02	0.18	2.00
573.17	573.3	-0.13	0.18	2.00
585.35	585.1	0.25	0.20	2.00
684.40	684.5	-0.10	0.18	2.00
740.72	741.0	-0.28	0.20	2.00
748.55	748.8	-0.25	0.18	2.00
807.03	807.3	-0.27	0.18	2.00
879.28	879.6	-0.32	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%

- End of Certificate -

เอกสารไม่ควบคุม

FM-708-02 R01 1/11/2021



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

Certificate of Calibration

Cert.No.: 24CH1115
Page.: 1 of 2

Equipment :
Manufacturer :
Model :
Serial No. :
ID. No. :
Condition As-Received:
Received Date :
Calibration Date :
Reference :
Submitted by :

Ambient Temperature :
Relative Humidity :
Calibration Procedure :

Calibrated by :

Approved by :

() Unnopphol Harachai
() Ponpan Paipim
(✓) Salthip Meangmai

Issue Date :

Turbidity Meter
Oakton
T100IR
1120501017
UAE.WAT.056/2563
Used Item
05 September 2024
06 September 2024
2409-0177DSC-1
United Analyst and Engineering Consultant Co.,Ltd.
3 Soi Udomsuk 41, Sukhumvit Road,
Bangchak, Phrakhanong, Bangkok 10260

(25 ± 2.5) °C
(50 ± 20) %
In - house method : CP-CH11
Direct measurement by
using Formazin standard solution

Walalak Sirithean

Salthip
Approved Signatory

9 September 2024

The Uncertainties are for a confidence probability of approximately 95%

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เอกสารไม่ควบคุม



Cert.No. : 24CH1115
Page : 2 of 2

Condition of this calibration result

1. Reference Standard Instruments :

Instruments	Serial No.	ID No.	Certificate No.	Due date
1) Thermo-Hygograph	1103328	130EC010	24H1372	12 July 2025
2) Electronic Balance	1126143764	140RC004	22MM22	20 Feb 2025

- This Certification is traceable to SI Through Technology Promotion Association (Thailand - Japan)

2. Standard Material : The Formazin suspension has been prepared gravimetric from

Material	Manufacturer	Lot No.	Assay
1) Hexamethylenetetramine	HIMEDIA	0000493947	99.65%
2) Hydrazinium Sulfate	HIMEDIA	0000522014	99.40%

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

Calibration result

Performing five - Formazin suspension standard curve by using 0,20,100,400,800 NTU Turbidity Meter Serial Number : 1120501017

Standard Formazine suspension (NTU)	UUC* Reading (NTU)	Uncertainty of Measurement (± NTU)	Coverage Factor k
0	0.00	0.0081	2.06
20	20.2	0.39	2.00
100	100	0.75	2.00
400	401	1.5	2.06
800	801	2.1	2.17

Remark - UUC* = Unit Under Calibration
- NTU = Nephelometric Turbidity Units

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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เอกสารไม่ควบคุม



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



Certificate of Calibration

Cert. No.: 25TM501
Page : 1 of 3

Equipment : Water Bath
Manufacturer : Memmert
Model : WNE 14
Serial No. : L414.1407
ID No. : UAE.MIC.006/2558
Submitted by : United Analyst and Engineering Consultant Co.,Ltd.
3 Soi Udomsuk 41, Sukhumvit Road,
Bangchak, Phrakhanong,
Bangkok 10260
Location : Microbiology Laboratory (302)
Received Order : 19 March 2025
Calibration Date : 19 March 2025
Ambient Temperature : (26 ± 10) °C
Relative Humidity : (50 ± 30) %
AC Line Voltage : (220 ± 22) V
Calibrated by : Krisda Malee
Approved by : Kunchit
Approved Signatory
() Chakrit Waewwanjua
() Suwit Imjai
(✓) Kunchit Promprat
Issue Date : 27 March 2025

The Uncertainties are for a confidence probability of approximately 95%

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

เอกสารไม่ควบคุม



Equipment : Water Bath
Condition As-Received : Used Item
Reference : 2503-0436OC-1
Procedure Used :-

Cert. No.: 25TM501
Page : 2 of 3

Calibration were conducted using in-house calibration procedure CP-OT04 Based on ASTM E715 according to direct measurement method with Data Acquisition which connected with Industrial Platinum Resistance Thermometer (IPRT).

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	MY57013823	23LM71	TPA	12 May 2025

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.

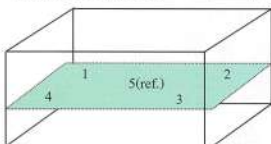
Remark : TPA : Technology Promotion Association (Thailand - Japan)

Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source

Heat transfer medium used : Water

	Environmental		AC Voltage Supply
	(°C)	(%R.H.)	(Volt)
Beginning of Calibration	24	50	220
Finished of Calibration	25	53	221



Front

Position :	Ref. Std. S/N.:
1	4804539-006
2	4804539-007
3	4804539-008
4	4804539-009
5(ref.)	4804539-010



Equipment : Water Bath
Condition As-Received : Used Item
Reference : 2503-0436OC-1
Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source

Cert. No.: 25TM501
Page : 3 of 3

Calibration point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Average* Standard Reading (°C)					Uncertainty (± °C)
			1	2	3	4	5 (ref.)	
44.5	44.4	44.4	44.508	44.531	44.495	44.537	44.510	0.15

Calibration point (°C)	Uniformity (°C)	Stability (± °C)	Coverage Factor k
44.5	0.092	0.048	2

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

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.

Stability : One-half of the greatest maximum difference of measured temperature at any one probe.

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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เอกสารไม่ควบคุม

เอกสารไม่ควบคุม

List of Instrument Certificates for Environmental Quality Analysis

No.	Instrument/Equipment	Parameter	Manufacturer	Model/Serial No.	Calibrator	Certification No.	Date of Calibration	Due date of Calibration*
1	DO Meter	DO	Horiba	LAQUA-DO210 / HE9M0011	Technology Promotion Association (Thailand-Japan)	25TW111	27/5/2025	25/5/2026
2	SCT Meter	CONDUCTIVITY (umhos/cm)	Horiba	LAQUA-EC210 / HC1L0016	Technology Promotion Association (Thailand-Japan)	25CH168	5/2/2025	3/2/2026
3	Inductively Coupled Plasma- Optical Emission Spectrometer(ICP-OES)	SODIUM SODIUM ADSORPTION RATIO	Agilent Technologies, USA	5110 VDV(G8015AA) / MY8030001	Agilent Technologies (Thailand) Co.,Ltd.	Preventive Maintenance Checklist	4/11/2024	3/11/2025
4	UV-VIS Spectrophotometer	NITRATE NITROGEN	Hitachi	U-2900 / 21E22-009	DQE Services Co.,Ltd.	SP25-001	3/1/2025	2/1/2026
5	UV/VIS Spectrophotometer	PHENOLS	Hitachi	U-5100 / 23A4-008	DQE Services Co.,Ltd.	SP24-028	11/9/2024	9/9/2025

Due Date of Calibration* : Based on the annual calibration plan. At least 1 time per year.



Certificate of Testing

Cert.No.: 25TW111
Page.: 1 of 2

Equipment : DO Meter
Manufacturer : Horiba
Model : LAQUA-DO210
Serial No. : HE9M0011
ID No. : UAE.EFM.017/2563 (EFM.DO.06/63)
Received Date : 26 May 2025
Test Date : 27 May 2025
Reference : 2505-0798WSC-1
Submitted by : United Analyst and Engineering Consultant Co.,Ltd.
3 Soi Udomsuk 41, Sukhumvit Road, Bangchak,
Phrakhanong, Bangkok 10260
Laboratory Condition : Temperature (25 ± 5) °C
Humidity (50 ± 20) %
Test Procedure : In - house method : CP-CH9
by Comparison Technique with Azide Modification Method
Tested by : Walalak Sirithean
Approved by : 
Approved Signatory
() Chakrit Waewwanjua
() Ponpan Paipim
(✓) Saitip Meangmai
Issue Date : 28 May 2025



Cert.No.: 25TW111
Page.: 2 of 2

Condition of this result of calibration

1. Reference Standard Instruments :
This measurement result is traceable to the International System of Unit through the reference standards laboratory of Industrial Calibration Center, Technology Promotion Association (Thailand-Japan).

Instruments	Serial No.	ID No.	Certificate No.	Due Date
1. Burette	-	130BU10	25CG1126	18 Mar 2027
2. Balance	14233821	110RC001	24MM131	04 July 2025

2. Standard Material :-

Material	Manufacturer	Lot.No.	Assay
Sodium Thiosulfate 5-Hydrate AR	KEMAUS	2203162447	99.6%

Result : Dissolved Oxygen Meter Adjustment With Air 100 %
Dissolved Oxygen Probe No.: 9K0H0035

Titration Method (Azide Modification Method) (mg/L)	DO Meter Reading (mg/L)	Standard Deviation (mg/L)
8.20	8.20	0.0071

This report was certified only for the instrument we tested. It is allowable to use for study
Intend to use for advertising and referral purpose is prohibited. This report may not be reproduced
other in full, without written approval of the laboratory

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Certificate of Calibration

Cert. No.: 25LM92
Page.: 1 of 2

Equipment : DO Meter with Sensor
Manufacturer : Horiba
Model : LAQUA-DO210
Serial No. : HE9M0011
ID No. : UAE.EFM.017/2563 (EFM.DO.06/63)
Submitted by : United Analyst and Engineering Consultant Co.,Ltd.
3 Soi Udomsuk 41, Sukhumvit Road,
Bangchak, Phrakhanong,
Bangkok 10260
Location : TPA On Site Calibration Laboratory
Received Order : 26 May 2025
Calibrated Date : 26 - 27 May 2025
Ambient Temperature : (26 ± 10) °C
Relative Humidity : (50 ± 30) %
AC Line Voltage : (220 ± 22) V
Calibrated by : Warakorn Lernagatrakul
Approved by : 
Approved Signatory
() Chakrit Waewwanjua
() Suwit Imjai
(✓) Kunchit Promprat
Issue Date : 28 May 2025



Equipment : DO Meter with Sensor
Condition As-Received : Used Item
Reference : 2505-0798WSC-2
Procedure Used :-

Cert. No.: 25LM92
Page.: 2 of 2

Calibration were conducted using in-house calibration procedure CP-OT01 according to comparison with Industrial Platinum Resistance Thermometer (IPRT) into Temperature Bath.
The temperature scale used was based on ITS-90.

Condition of this result of calibration

1. Reference standard instrument:-

Instrument	Serial No.	Cert. No.	Traceable	Due Date
1) Digital Thermometer	2188080	2411022	TPA	17 Sep 2025
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 : Temperature measurement.

This instrument was connected with temperature sensor, S/N.: 9K0H0035

Calibration Point (°C)	Immersion Depth (mm)	Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	Uncertainty (\pm °C)	Coverage Factor k
15.0	80	15.005	15.0	-0.005	0.16	2.00
30.0	80	30.004	30.0	-0.004	0.16	2.00
45.0	80	45.001	45.0	-0.001	0.16	2.00

UUC* : Unit Under Calibration

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

-o0o-

The Uncertainties are for a confidence probability of approximately 95%

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



Certificate of Calibration

Cert.No.: 25CH168
Page.: 1 of 3

Equipment : Conductivity Meter
Manufacturer : Horiba
Model : LAQUA-EC210
Serial No. : HC1L0016
ID No. : UAE.EFM.014/2565(EFM.SCT.01/65)
Condition As-Received: Used Item
Received Date : 04 February 2025
Calibration Date : 05 February 2025
Reference : 2502-0107WSC-4
Submitted by : United Analyst and Engineering Consultant Co.,Ltd.
3 Soi Udomsuk 41, Sukhumvit Road,
Bangchak, Phrakhanong, Bangkok 10260
Ambient Temperature : (25 ± 2.5) °C
Relative Humidity : (50 ± 15) %
Calibration Procedure: In-house method :
- CP-CH6 by direct measurement
with certified reference material (CRM)
- CP-CH8 by comparison with temperature standard
Calibrated by : Warakorn Lerngagtrakul
Approved by : _____
() Chakrit Waewwanjua
() Ponpan Paipim
(✓) Sathip Meangmai
Issue Date : 06 February 2025

The Uncertainties are for a confidence probability of approximately 95%

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

Condition of this result of calibration

1. Reference Standard Instrument :-

Instrument	Serial No.	ID No.	Certificate No.	Due date
1) Thermometer	1963878	130RC095	24I995	09 Sep 2025
2) Ref. Std.Thermometer	4982054	110RC044	24I757	14 July 2025

- This Certification is traceable to SI Through Technology Promotion Association (Thailand - Japan)

2. Certified Reference Materials :-

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

Conductivity Solution	Manufacturer	Lot No.	Exp. date
1412.9 µS/cm	CPA Chem	1005307	15 June 2025
12.881 mS/cm	CPA Chem	1005308	15 June 2025

- Control Conductivity calibration solution temperature by Water bath (25 ± 0.1) °C

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

Calibration results

Function : Conductivity Measurement

(*) After Adjustment at 1412.9 µS/cm

Conductivity Electrode Serial No.: 9B1J0042

Standard Conductivity Solution	Before Adjustment UUC* Reading	After Adjustment UUC* Reading	Uncertainty of Measurement (±)	Coverage factor k
1412.9 µS/cm	1355 µS/cm	1413 µS/cm	9.2 µS/cm	2.00
12.881 mS/cm	12.26 mS/cm	12.72 mS/cm	0.086 mS/cm	2.00

Remark : - UUC* = Unit Under Calibration



Cert.No.: 25CH168
Page.: 3 of 3

Calibration Results

Function : Temperature Measurement

This equipment was connected with Temperature Probe;

- Model : 9383
- Serial No. : 9B1J0042

Dimension of probe;

- Length : 110 mm
- Diameter : 16 mm
- Immersion Depth : 100 mm

Calibration Result : Without adjustment

Calibration Point (°C)	Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	Uncertainty of Measurement (± °C)	Coverage factor k
15.0	15.003	15.0	-0.003	0.13	2.00
30.0	30.002	29.9	-0.102	0.13	2.00
45.0	45.001	44.9	-0.102	0.13	2.00

Remark : - UUC* = Unit Under Calibration

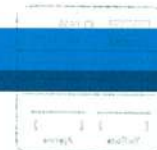
The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor k, providing a level of confidence of approximately 95 %.

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Agilent CrossLab Start Up Services

Agilent 5100 5110 ICP-OES Preventive Maintenance



Agilent Preventive Maintenance provides factory recommended service for your analytical instruments to assure reliable operation and the accuracy of your results

Delivered by highly trained and certified service engineers using genuine Agilent parts and supplies, Agilent Preventive Maintenance provides what you need to reduce unplanned downtime and keep your systems operating at their peak performance.

This checklist is used as a guide for completing the preventive maintenance tasks. A signed copy of this checklist is provided for your records.



Introduction

Customer Information

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

Important Customer Web Links

- To access **Agilent University**, visit <http://www.agilent.com/crosslab/university/> to learn about training options, which include online, classroom and onsite delivery. A training specialist can work directly with you to help determine your best options.
- To access the **Agilent Resource Center** web page, visit <https://www.agilent.com/en-us/agilentresources>. The following information topics are available:
 - Sample Prep and Containment
 - Chemical Standards
 - Analysis
 - Service and Support
 - Application Workflows
- The **Agilent Community** is an excellent place to get answers, collaborate with others about applications and Agilent products, and find in-depth documents and videos relevant to Agilent technologies. Visit <https://community.agilent.com/welcome>
- Videos about specific preparation requirements for your instrument can be found by searching the **Agilent YouTube** channel at <https://www.youtube.com/user/agilent>
- Need to place a service call? [Flexible Repair Options | Agilent](#)

Service Engineer's Responsibilities

- Contact the customer and ensure that all necessary supplies are available before the preventive maintenance visit.
- Only select those pages that relate to the system or module being serviced.
- Complete empty fields with the relevant information.
- Complete the relevant checkboxes in the checklist using either a "X" or tick mark "✓".
- Check "Service not applicable" check boxes to indicate services/tasks not delivered, as appropriate.
- Complete the Preventive Maintenance services in the most logical order relevant to the individual system service in the order of the tasks listed.
- Complete the **Service Review** section together with the customer.
- Complete the fields for page numbers at the foot of each selected page.
- Add relevant page numbers to selected pages and complete the total number of pages field in the Service Completion section.
- Ask the customer to sign the Service Verification section including the customer's and your signature.

Instrument Maintenance

System Information

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

Instrument System Name and ID	5110 VDV ICP-OES
Instrument System Site and Location	United Analyst and Engineering Consultant

List System Component Product Numbers	List the Serial Numbers of each Component
1. G 705A	77 14030001
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	

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

Preparation

- ☒ Discuss any specific issues with the customer before starting.
- ☒ Review the instrument logbook for recorded problems and comments.
- ☒ Save instrument control settings before starting the procedure.
- ☒ Perform a general inspection of the system for cleanliness.
- ☒ Check for proper installation of parts, assemblies, sensors etc.
- ☒ Check system for required installation of components and implementation of Service Notes
- ☒ Check for required firmware/software updates and verify with customers if they would like them installed.
- ☐ For HF application systems, if standard sample introduction system was not installed, ask the customer to install it. *Not applicable*
- ☒ Ask the customer to remove any samples from the ICP-OES sample introduction area, auto sampler or around the ICP-OES.

Preventive Maintenance Procedures

Record Pre-PM instrument performance

- ☒ Run Instrument Performance test.
- ☒ Record results in Instrument Performance Test Results Table – Pre-PM.

Clean and inspect ICP-OES system

- ☒ Look for any obvious external damage or problems.
- ☒ Inspect water cooling hoses, gas lines and power cord for excessive wear or damage.
- ☒ Perform a general internal inspection of the system for excessive dust accumulation, clean if necessary.
- ☒ Inspect sample introduction components and record any required maintenance in the Service Engineer Comments and notify the customer as the required actions required.
- ☒ Record the instrument operating conditions in the ICP-OES Status Results Table.
- ☒ Replace the polychromator purge filter.
- ☒ Replace the radial pre-optics window
- ☒ Replace the axial pre-optics window for SVDV and VDV instruments.
- ☒ Check exhaust flow for the correct positive extraction at the exhaust duct to insure they meet minimum specifications.
- ☒ Replace air inlet dust filter.
- ☐ Replace high capacity air inlet dust filter element if installed. *Not applicable*
- ☒ Remove and clean instrument water inlet filter.

Agilent Water Recirculator

- ☐ Service not applicable
- ☒ Drain cooling fluid and remove any particles from the chiller reservoir
- ☒ Remove, clean and reinstall water inlet metal mesh filter if present.
- ☒ Re fill with Agilent Cool Clear cooling fluid.
- ☒ Clean the cooling system Air filter and the condenser.

SPS 3 Auto Sampler

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

SPS 4 Auto sampler

- ☒ Service not applicable
- ☐ Clean the spill tray, rack location mat, end frames and chassis with a damp soft cloth and diluted mild detergent.
- ☐ Clean the auto sampler cover panels, if cover kit is installed, with domestic window cleaner.
- ☐ Check the X-axis and Z-axis drive belts for cracks, splits, damaged teeth, excessive fraying, color changes or degradation from fumes.
- ☐ Check the X-axis, Theta-axis and Z-axis FFC cables for cracks, incorrect positioning, damaged edges or damaged connectors.
- ☐ Pump Tubing Replacement. Replace peristaltic pump tubing. Replace all tubing that goes from the rinse station to the pump and from the pump to the waste/rinse bottles
- ☐ Test using customer's tray and move the sample probe to the sample vial 1, wash vial and rinse port and ensure that the probe is centered in the vial. If not use calibration wizard and calibrate the position.

AVS 4, 6, 7 Advanced Valve System

- ☒ Service not applicable
- ☐ Replace valve rotor seal
- ☐ Check fittings for signs of leaks
- ☐ Check tubing including autosampler tubing for kinks or excessive wear
- ☐ Check high flow pump for signs of leaks

ICP-OES adjustment

- ☒ Check position of Zn peak, adjust if required.
- ☒ Check Argon Ratio, adjust to specified value if required.
- ☒ Perform Detector Calibration.
- ☒ Perform Instrument Calibration.

Record Post-PM instrument performance

- ☒ Run Instrument Performance test.
- ☒ Record results in Instrument Performance Test Results Table - Post PM.
- ☒ For systems using ICP Expert version 7.3 and above, run the following Instrument tests
 - ☒ Subsystem Communications Test
 - ☒ Air Flow
 - ☒ Water Flow
 - ☒ Gas Flows
 - ☒ RF Generator
 - ☒ Camera Test
 - ☒ Optics Test
 - ☒ Nebulizer Test
- ☒ Record the result in the Instrument Test Results Table

Restore Instrument

- ☐ For HF applications, ask the customer to reinstall their sample introduction system. N/A
- ☒ Leave system in an idle state: on and purging.
- ☒ Guidance: If the PM service is performed prior to a qualification service, then use the qualification procedure as a guide for final instrument set up and checkout.

Service Review

- ☒ Attach available reports/printouts of all tests to this documentation.
- ☒ Record the Preventive Maintenance service activity in the customer's records/logbook.
- ☒ Record the PM event in the Smart Alerts logbook, if applicable.
- ☒ Update/reset instrument maintenance counters as appropriate.
- ☒ Affix the PM sticker to the system or instrument logbook based on the customer's request.
- ☒ Complete the Service Engineer Comments section if there are additional comments.
- ☒ Review this service, parts replaced, and test results obtained with the customer.
- ☒ If the instrument firmware was updated, record the details of the change in the Service Engineer's Comments box. Systems in a compliant environment may need additional documentation.
- ☒ Complete the Signature Page with both Service Engineer and Customer signatures.

Test Results

Instrument Performance Test Results Table

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

	Pre PM Sensitivity Check		Post PM Sensitivity Check	
	Radial	Axial *	Radial	Axial*
Zn 213.857 nm SRBR	1500.9	2219.4	4124.9	6969.9
Mn 257.610 nm SRBR	3915.0	7492.2	13017.6	31127.6
Al 396.152 nm SBR	9.9	10.7	9.7	21.1
K 766.491 nm SBR	5.9	28.1	4.8	45.3

* 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

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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	231.411	VAC	226.871	VAC
Mains Current	0.051	A	0.105	A
Instrument Temperature	22.1	°C	23.5	°C
RF Air Flow (sensor speed)	14.0	Hz	19.0	Hz
Plasma Exhaust Temperature	No measurement		63.9	°C
Water Flow Oscillator	No measurement		1.34	L/min
Water Flow Detector	0.86	L/min	0.81	L/min
Water Inlet Temperature	19.7	°C	19.7	°C
Polychromator Temperature	35.0	°C	35.0	°C
CCD Temperature	-40.1	°C	-39.6	°C
Thermal Stabilizer	35.0	°C	35.0	°C
Argon Supply Pressure	646.92	kPa	591.55	kPa
Purge Gas Supply Pressure*1	646.66	kPa	612.41	kPa
Option Gas Supply Pressure*1	—	kPa	—	kPa
Nebulizer Flow	No measurement		0.70	L/min
Nebulizer Back Pressure	No measurement		158.43	kPa
Plasma Gas Flow	No measurement		11.91	L/min
Auxiliary Gas Flow	No measurement		1.00	L/min
RF Power	No measurement		1204.7	W
RF Supply Current	No measurement		7.956	A
RF Supply Voltage	No measurement		204.417	V

*1 If option installed

Consumed PM Parts

Part Description	Part Number	Product or Model# where used	Quantity consumed
Axial Pre-Optic Window	G8010-68014	G8010A, G8011A, G8014A/G8015A	1
Radial Pre-Optic Window	G8010-68015	All	1
Agilent Cool Clear Coolant Fluid	5799-0037	Agilent Water Recirculator	—
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 engineer's 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	—

Consumed Parts Reference

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

☒ Section Not Applicable.

Part Description	Part Number	Product or Model# where used	Quantity consumed

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Signature Page

Service Engineer Comments (optional)

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

Service Verification

Service Request Number:

6003197100

Date Service Completed:

04 Nov 2024

Service Engineer Name:

Kanyakorn S.

Customer Name:

Aphorn Onkong

Service Engineer Signature:

Kanyakorn S.

Customer Signature:

Aphorn Onkong

Total number of pages in this document:

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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 Pre Test_PM_Kanyakorn S.
Test Completed On 11/4/2024 9:19:10 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	Fail
Precision Test	Pass

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Resolution Test

Pass

Element Wavelength	Specification	Width
N (174.213 nm)	≤ 9.40	6.98
As (188.980 nm)	≤ 8.20	6.17
C (193.027 nm)	≤ 11.50	8.30
Mo (202.032 nm)	≤ 8.20	6.38
Cr (206.158 nm)	≤ 13.40	8.98
Zn (213.857 nm)	≤ 8.70	6.60
Pb (220.353 nm)	≤ 9.50	7.09
Co (228.615 nm)	≤ 17.20	11.67
Ba (230.424 nm)	≤ 9.40	7.20
Mn (257.610 nm)	≤ 13.30	9.43
Mn (260.568 nm)	≤ 20.30	14.11
Cr (267.716 nm)	≤ 11.00	8.04
Cu (324.754 nm)	≤ 25.00	18.97
Cu (327.395 nm)	≤ 14.20	11.23
Sr (338.071 nm)	≤ 33.50	24.30
Ba (455.403 nm)	≤ 44.00	33.47
Sr (460.733 nm)	≤ 36.00	17.23
Ba (493.408 nm)	≤ 36.00	25.37
Ba (614.171 nm)	≤ 42.00	25.54
Ar (675.283 nm)	≤ 74.00	56.51
K (766.491 nm)	≤ 80.00	65.86

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Sensitivity Test

Fail

Radial					
Element Wavelength	Specification	Method	Ratio	Standard	Blank
As (188.980 nm)	≥ 46.0	SRBR	104.1	793.0	50.8
Se (196.026 nm)	≥ 41.0	SRBR	87.6	862.0	79.7
Zn (213.857 nm)	≥ 1421.0	SRBR	1500.8	41823.3	749.0
Pb (220.353 nm)	≥ 46.0	SRBR	170.7	2432.0	174.9
Mn (257.610 nm)	≥ 3518.0	SRBR	3915.0	264700.2	4420.0
Al (396.152 nm)	≥ 3.4	SBR	7.7	48454.6	5563.2
Ba (493.408 nm)	≥ 34.0	SBR	45.9	1966719.7	41903.8
K (766.491 nm)	≥ 1.8	SBR	5.7	99038.2	14687.7
Axial					
Element Wavelength	Specification	Method	Ratio	Standard	Blank
As (188.980 nm)	≥ 208.0	SRBR	126.5	1498.8	119.0
Se (196.026 nm)	≥ 159.0	SRBR	112.0	1773.6	197.8
Zn (206.200 nm)	≥ 234.0	SRBR	466.0	6784.2	199.7
Zn (213.857 nm)	≥ 1743.0	SRBR	2217.4	95597.6	1789.7
Cd (214.439 nm)	≥ 4227.0	SRBR	1919.3	68724.6	1236.4
Pb (220.353 nm)	≥ 320.0	SRBR	332.6	7929.5	499.0
Mn (257.610 nm)	≥ 10625.0	SRBR	7492.2	991238.3	16911.7
Cr (267.716 nm)	≥ 1048.0	SRBR	2254.6	129706.6	3150.9
Cu (324.754 nm)	≥ 19.0	SBR	26.9	290746.3	10407.5
Al (396.152 nm)	≥ 6.0	SBR	10.7	211329.2	18005.0
Ba (493.408 nm)	≥ 60.0	SBR	49.3	6956460.4	138336.9
K (766.491 nm)	≥ 24.0	SBR	28.1	1395190.2	47996.2

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Precision Test			Pass
Radial			
Element Wavelength	Specification	Measured Value % RSD	
As (188.980 nm)	≤ 2.60	0.73	
Se (196.026 nm)	≤ 2.60	0.95	
Zn (213.857 nm)	≤ 1.50	0.31	
Pb (220.353 nm)	≤ 2.60	0.73	
Mn (257.610 nm)	≤ 1.50	0.39	
Al (396.152 nm)	≤ 1.50	0.39	
Ba (493.408 nm)	≤ 1.50	0.87	
K (766.491 nm)	≤ 1.50	0.32	
Axial			
Element Wavelength	Specification	Measured Value % RSD	
As (188.980 nm)	≤ 1.50	1.21	
Se (196.026 nm)	≤ 1.50	0.84	
Zn (206.200 nm)	≤ 1.50	0.56	
Zn (213.857 nm)	≤ 1.50	0.96	
Cd (214.439 nm)	≤ 1.50	0.26	
Pb (220.353 nm)	≤ 1.50	0.51	
Mn (257.610 nm)	≤ 1.50	0.97	
Cr (267.716 nm)	≤ 1.50	0.22	
Cu (324.754 nm)	≤ 1.50	0.24	
Al (396.152 nm)	≤ 1.50	0.33	
Ba (493.408 nm)	≤ 1.50	0.40	
K (766.491 nm)	≤ 1.50	0.65	

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	
Flame ID	3442	
Tested By	Post Test_PM_Kanyakorn S.	
Test Completed On	11/4/2024 11:07:24 AM	
Result Summary		
Subsystem Communications Test		Pass
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		Fail
Precision Test		Pass
Subsystem Communications Test		Pass
Optics Test		Pass
	Radial	Axial
Intensity	3184054	3177175
Wavelength	737.212	737.212

เอกสารไม่ควบคุม

Resolution Test		Pass
Element Wavelength	Specification	Width
N (174.213 nm)	≤ 9.40	6.97
As (188.980 nm)	≤ 8.20	6.14
C (193.027 nm)	≤ 11.50	8.33
Mo (202.032 nm)	≤ 8.20	6.33
Cr (206.153 nm)	≤ 13.40	9.06
Zn (213.637 nm)	≤ 8.70	6.70
Pb (220.353 nm)	≤ 9.50	7.03
Co (228.615 nm)	≤ 17.20	11.72
Ba (230.424 nm)	≤ 9.40	7.32
Mn (257.610 nm)	≤ 13.30	9.44
Mn (260.568 nm)	≤ 20.30	14.21
Cr (267.716 nm)	≤ 11.00	7.94
Cu (324.754 nm)	≤ 25.00	18.99
Cu (327.395 nm)	≤ 14.20	11.27
Sr (338.071 nm)	≤ 33.50	24.40
Ba (455.403 nm)	≤ 44.00	33.50
Sr (460.733 nm)	≤ 36.00	17.31
Ba (493.408 nm)	≤ 36.00	25.44
Ba (614.171 nm)	≤ 42.00	25.16
Ar (675.283 nm)	≤ 74.00	56.15
K (766.491 nm)	≤ 80.00	65.56

เอกสารไม่ควบคุม

Sensitivity Test			Fail			
Radial						
Element	Wavelength	Specification	Method	Ratio	Standard	Blank
As	(188.980 nm)	≥ 46.0	SRBR	130.6	977.1	50.4
Se	(196.026 nm)	≥ 41.0	SRBR	106.0	958.7	70.2
Zn	(213.857 nm)	≥ 1421.0	SRBR	4124.8	44037.7	113.4
Pb	(220.353 nm)	≥ 46.0	SRBR	207.2	2554.7	136.2
Mn	(257.610 nm)	≥ 3518.0	SRBR	13017.8	271846.6	434.7
Al	(396.152 nm)	≥ 3.4	SBR	9.7	50615.5	4717.0
Ba	(493.408 nm)	≥ 34.0	SBR	133.7	2069203.0	15359.3
K	(766.491 nm)	≥ 1.8	SBR	4.8	100199.5	17235.5
Axial						
Element	Wavelength	Specification	Method	Ratio	Standard	Blank
As	(188.980 nm)	≥ 208.0	SRBR	174.9	1566.7	73.0
Se	(196.026 nm)	≥ 159.0	SRBR	167.0	1863.4	110.2
Zn	(206.200 nm)	≥ 234.0	SRBR	740.9	6836.0	83.1
Zn	(213.857 nm)	≥ 1743.0	SRBR	6965.9	101568.1	211.7
Cd	(214.430 nm)	≥ 4227.0	SRBR	5781.0	72852.9	158.1
Pb	(220.353 nm)	≥ 320.0	SRBR	501.0	8464.3	267.7
Mn	(257.610 nm)	≥ 10625.0	SRBR	31121.6	1006637.8	1044.0
Cr	(267.716 nm)	≥ 1048.0	SRBR	4424.8	132202.9	880.8
Cu	(324.754 nm)	≥ 19.0	SBR	68.7	302907.8	4345.6
Al	(396.152 nm)	≥ 6.0	SBR	21.1	218771.0	9892.3
Ba	(493.408 nm)	≥ 60.0	SBR	250.6	7137380.9	28367.3
K	(766.491 nm)	≥ 24.0	SBR	45.3	1435050.6	31025.0

เอกสารไม่ควบคุม

Precision Test			Pass
Radial			
Element Wavelength	Specification	Measured Value % RSD	
As (188.980 nm)	≤ 2.60	0.81	
Se (196.026 nm)	≤ 2.60	0.98	
Zn (213.857 nm)	≤ 1.50	0.22	
Pb (220.353 nm)	≤ 2.60	0.37	
Mn (257.610 nm)	≤ 1.50	0.27	
Al (396.152 nm)	≤ 1.50	0.25	
Ba (493.408 nm)	≤ 1.50	0.53	
K (766.491 nm)	≤ 1.50	0.15	
Axial			
Element Wavelength	Specification	Measured Value % RSD	
As (188.980 nm)	≤ 1.50	0.81	
Se (196.026 nm)	≤ 1.50	0.65	
Zn (206.200 nm)	≤ 1.50	0.79	
Zn (213.857 nm)	≤ 1.50	0.81	
Cd (214.439 nm)	≤ 1.50	0.35	
Pb (220.353 nm)	≤ 1.50	0.33	
Mn (257.610 nm)	≤ 1.50	1.02	
Cr (267.716 nm)	≤ 1.50	0.32	
Cu (324.754 nm)	≤ 1.50	0.51	
Al (396.152 nm)	≤ 1.50	0.37	
Ba (493.408 nm)	≤ 1.50	0.68	
K (766.491 nm)	≤ 1.50	0.74	

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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	Post Test_PM_Kanyakorn S.	
Test Completed On	11/4/2024 11:30:15 AM	
Result Summary		
Subsystem Communications Test	Pass	
Air Flow Test	Pass	
Water Flow Test	Pass	
Gas Flows Test	Pass	
RF Generator Test	Pass	
Camera Test	Pass	
Optics Test	Skipped	
Advanced Valve System Test	Skipped	
Resolution Test	Skipped	
Sensitivity Test	Skipped	
Precision Test	Skipped	
Subsystem Communications Test	Pass	
Air Flow Test	Pass	
30% Air Flow (relative speed)	75% Air Flow (relative speed)	
15.00	19.00	
Water Flow Test	Pass	
RF Water Flow(L/min)	Camera Water Flow (L/min)	Water Inlet Temperature (°C)
1.30	0.81	20.55

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เอกสารไม่ควบคุม

Gas Flows Test			Pass		
Nebulizer Target Flow	Actual Flow	Back Pressure	Auxiliary Target Flow	Actual Flow	Back Pressure
0.70	0.70	154.65	2.00	2.00	110.92
Makeup Target Flow	Actual Flow	Back Pressure	Plasma Target Flow	Actual Flow	Back Pressure
2.00	2.00	115.38	18.00	17.97	21.48
RF Generator Test			Pass		
RF Power Supply Test	Passed				
RF Power Supply (V)	128.554				
RF Oscillator Test	Passed				
RF Oscillator Frequency (MHz)	25.834				
Work Coil Current (A)	44.660				
RF Power Supply Current (A)	1.999				
Camera Test			Pass		
	Integration Time (ms)	Standard Deviation	Status		
Electronic Offset Test	1000	5.228	Passed		
Dark Current Test	6000	1.168	Passed		
Array Test	5	0.024	Passed		
Linearity Test		0.118	Passed		

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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	change mirror
Test Completed On	11/6/2024 10:35:26 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

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เอกสารไม่ควบคุม

Resolution Test			Pass
Element Wavelength	Specification	Width	
N (174.213 nm)	≤ 9.40	6.79	
As (188.980 nm)	≤ 8.20	5.80	
C (193.027 nm)	≤ 11.50	8.15	
Mo (202.032 nm)	≤ 8.20	5.90	
Cr (206.158 nm)	≤ 13.40	8.85	
Zn (213.857 nm)	≤ 8.70	6.77	
Pb (220.353 nm)	≤ 9.50	6.61	
Co (228.615 nm)	≤ 17.20	11.79	
Ba (230.424 nm)	≤ 9.40	7.25	
Mn (257.610 nm)	≤ 13.30	9.47	
Mn (260.568 nm)	≤ 20.30	14.50	
Cr (267.716 nm)	≤ 11.00	7.91	
Cu (324.754 nm)	≤ 25.00	18.72	
Cu (327.395 nm)	≤ 14.20	11.09	
Sr (338.071 nm)	≤ 33.50	25.39	
Ba (455.403 nm)	≤ 44.00	33.09	
Sr (460.793 nm)	≤ 36.00	18.54	
Ba (493.408 nm)	≤ 36.00	25.74	
Ba (614.171 nm)	≤ 42.00	25.23	
Ar (675.283 nm)	≤ 74.00	58.92	
K (766.491 nm)	≤ 80.00	63.16	

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เอกสารไม่ควบคุม

Sensitivity Test						Pass
Radial						
Element Wavelength	Specification	Method	Ratio	Standard	Blank	
As (188.980 nm)	≥ 46.0	SRBR	110.5	868.9	54.3	
Se (196.026 nm)	≥ 41.0	SRBR	88.3	934.7	91.3	
Zn (213.857 nm)	≥ 1421.0	SRBR	3535.4	44017.7	153.9	
Pb (220.353 nm)	≥ 46.0	SRBR	184.5	2492.3	159.8	
Mn (257.610 nm)	≥ 3518.0	SRBR	11099.6	249595.3	503.6	
Al (396.152 nm)	≥ 3.4	SBR	8.7	50274.4	5172.0	
Ba (493.408 nm)	≥ 34.0	SBR	124.5	1903164.1	15166.0	
K (766.491 nm)	≥ 1.8	SBR	6.9	110041.4	13991.2	
Axial						
Element Wavelength	Specification	Method	Ratio	Standard	Blank	
As (188.980 nm)	≥ 208.0	SRBR	253.3	3744.3	196.3	
Se (196.026 nm)	≥ 159.0	SRBR	206.7	4199.7	347.2	
Zn (206.200 nm)	≥ 234.0	SRBR	923.0	12282.3	172.1	
Zn (213.857 nm)	≥ 1743.0	SRBR	6398.3	157551.5	601.7	
Cd (214.439 nm)	≥ 4227.0	SRBR	5069.2	99873.7	385.2	
Pb (220.353 nm)	≥ 320.0	SRBR	389.0	10641.1	658.6	
Mn (257.610 nm)	≥ 10625.0	SRBR	21190.4	985528.7	2153.6	
Cr (267.716 nm)	≥ 1048.0	SRBR	3054.1	131797.6	1811.5	
Cu (324.754 nm)	≥ 19.0	SBR	36.3	301401.4	8082.9	
Al (396.152 nm)	≥ 6.0	SBR	10.8	228359.5	19280.5	
Ba (493.408 nm)	≥ 60.0	SBR	106.5	6460421.5	60122.8	
K (766.491 nm)	≥ 24.0	SBR	30.2	1639840.6	52562.1	


Page 3 of 4

เอกสารไม่ควบคุม

Precision Test			Pass
Radial			
Element Wavelength	Specification	Measured Value % RSD	
As (188.980 nm)	≤ 2.60	1.56	
Se (196.026 nm)	≤ 2.60	1.16	
Zn (213.857 nm)	≤ 1.50	0.50	
Pb (220.353 nm)	≤ 2.60	0.74	
Mn (257.610 nm)	≤ 1.50	0.63	
Al (396.152 nm)	≤ 1.50	0.54	
Ba (493.408 nm)	≤ 1.50	0.78	
K (766.491 nm)	≤ 1.50	0.44	
Axial			
Element Wavelength	Specification	Measured Value % RSD	
As (188.980 nm)	≤ 1.50	0.82	
Se (196.026 nm)	≤ 1.50	0.82	
Zn (206.200 nm)	≤ 1.50	0.35	
Zn (213.857 nm)	≤ 1.50	0.34	
Cd (214.439 nm)	≤ 1.50	0.44	
Pb (220.353 nm)	≤ 1.50	0.48	
Mn (257.610 nm)	≤ 1.50	0.83	
Cr (267.716 nm)	≤ 1.50	0.53	
Cu (324.754 nm)	≤ 1.50	0.69	
Al (396.152 nm)	≤ 1.50	0.56	
Ba (493.408 nm)	≤ 1.50	1.29	
K (766.491 nm)	≤ 1.50	0.74	

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เอกสารไม่ควบคุม

DQE Services 32 Soi Ladprao-Wanghin 55, Ladprao-Wanghin Rd., Ladprao, Bangkok 10230 Phone : +66 (0)2 538 2054, Email : dqeservicesinfo@gmail.com		
CERTIFICATE OF CALIBRATION		
Certificate No. : SP25-001		Page 1 of 5
Customer : United Analyst and Engineering Consultant Co.,Ltd. (Head Office)		
Address : 3 Soi Udomsuk 41, Sukhumvit Road, Bangchak, Phrakhanong, Bangkok 10260		
Location of calibration : Laboratory 213		
Equipment : UV-Vis Spectrophotometer		
Manufacturer : Hitachi		
Model : U-2900		
Serial No. : 21E22-009		
ID No. : UAE.WAT.051/2564		
Received Date : 3 January 2025		
Calibration Date : 3 January 2025		
Issue Date : 8 January 2025		
Condition Instrument : Good		
Calibrated by :  (Mr.Tanawut Rittidach) Technical Manager	Approved by :  (Ms. Chonthicha Sangnorn) Quality Manager	
The calibration result is applied only to the above calibrated item and was found accurate as shown on date and place of calibration only. The measurement capability of the laboratory and its traceability to recognized national standards and to the unit of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written permission of DQE Services Co., Ltd.		

เอกสารไม่ควบคุม



REPORT OF CALIBRATION

Certificate No. : SP25-001

Page 2 of 5

Environment Condition : Ambient Temperature 25 ± 5 °CRelative humidity 55 ± 20 %RH

Calibration method : In-house method CP-01 Based on ASTM E275-08

Certified Reference Materials :

Material	Serial No.	Certificate No.	Due date
Absorbance Standard set	25760	115663	25 October 2025
Absorbance Standard set	25757	115638	25 October 2025
Wavelength Standard set	25806	115657	25 October 2025
Wavelength Standard set	25758	115665	25 October 2025

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

Institute of Standards and Technology (NIST) through Starna Scientific Limited

Spectral Band Width of UUC : 1.5 nm.

Scan Speed of UUC : 200 nm/min

Scan Interval of UUC : 0.1 nm.

Resolution of UUC : Photometric 0.001 Abs.

Wavelength 0.1 nm.

เอกสารไม่ควบคุม

FM-708-02 R01 1/11/2021



REPORT OF CALIBRATION

Certificate No. : SP25-001

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Calibration Results : Without adjustment

Photometric Accuracy :

Wavelength (nm.)	CRMs Values (Abs)	UUC Reading (Abs)	Correction (Abs)	Uncertainty (Abs)	Coverage factor k
420	0.0000	0.000	0.0000	0.0028	2.00
	0.5780	0.578	0.0000	0.0031	2.00
	1.0484	1.045	0.0034	0.0029	2.00
	2.1876	2.192	-0.0044	0.0075	2.00
440	0.0000	0.000	0.0000	0.0028	2.00
	0.5595	0.560	-0.0005	0.0034	2.00
	1.0239	1.023	0.0009	0.0035	2.00
	2.1230	2.125	-0.0020	0.0079	2.00
465	0.0000	0.000	0.0000	0.0028	2.00
	0.5230	0.521	0.0020	0.0030	2.00
	0.9633	0.961	0.0023	0.0029	2.00
	1.9753	1.977	-0.0017	0.0070	2.00
546.1	0.0000	0.000	0.0000	0.0028	2.00
	0.5181	0.518	0.0001	0.0031	2.00
	1.0002	0.998	0.0022	0.0033	2.00
	1.9973	1.993	0.0043	0.0084	2.00
590	0.0000	0.000	0.0000	0.0028	2.00
	0.5517	0.552	-0.0003	0.0030	2.00
	1.0803	1.079	0.0013	0.0030	2.00
	2.0373	2.032	0.0053	0.0079	2.00
635	0.0000	0.000	0.0000	0.0028	2.00
	0.5591	0.559	0.0001	0.0031	2.00
	1.0518	1.050	0.0018	0.0030	2.00
	1.9274	1.923	0.0044	0.0079	2.00

เอกสารไม่ควบคุม

FM-708-02 R01 1/11/2021



REPORT OF CALIBRATION

Certificate No. : SP25-001

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Photometric Accuracy :

Wavelength (nm.)	CRMs Values (Abs)	UUC Reading (Abs)	Correction (Abs)	Uncertainty (Abs)	Coverage factor k
235	0.0000	0.000	0.0000	0.0050	2.00
	0.7469	0.744	0.0029	0.0057	2.00
257	0.0000	0.000	0.0000	0.0050	2.00
	0.8674	0.863	0.0044	0.0059	2.00
313	0.0000	0.000	0.0000	0.0050	2.00
	0.2919	0.290	0.0019	0.0051	2.00
350	0.0000	0.000	0.0000	0.0050	2.00
	0.6430	0.640	0.0030	0.0055	2.00

เอกสารไม่ควบคุม

FM-708-02 R01 1/11/2021



REPORT OF CALIBRATION

Certificate No. : SP25-001

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Wavelength Accuracy :

CRMs Values (nm.)	UUC Reading (nm.)	Correction (nm.)	Uncertainty (nm.)	Coverage factor k
241.72	241.1	0.62	0.18	2.00
279.45	279.0	0.45	0.18	2.00
287.81	287.3	0.51	0.18	2.00
334.06	333.8	0.26	0.18	2.00
360.93	360.6	0.33	0.18	2.00
418.59	418.2	0.39	0.18	2.00
445.94	445.5	0.44	0.18	2.00
453.66	453.4	0.26	0.18	2.00
460.02	459.8	0.22	0.18	2.00
536.59	536.6	-0.01	0.18	2.00
637.98	637.7	0.28	0.18	2.00
431.38	431.1	0.28	0.18	2.00
472.50	472.3	0.20	0.18	2.00
513.47	513.4	0.07	0.18	2.00
528.88	528.9	-0.02	0.18	2.00
573.17	573.3	-0.13	0.18	2.00
585.35	585.1	0.25	0.20	2.00
684.40	684.5	-0.10	0.18	2.00
740.72	741.0	-0.28	0.20	2.00
748.55	748.8	-0.25	0.18	2.00
807.03	807.3	-0.27	0.18	2.00
879.28	879.6	-0.32	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%

- End of Certificate -

เอกสารไม่ควบคุม

FM-708-02 R01 1/11/2021

DQE Services Co.,Ltd.

DQE Services

32 Soi Ladprao-Wanghin 55, Ladprao-Wanghin Rd., Ladprao, Bangkok 10230

Phone : +66 (0)2 538 2054, Email : dqeservicesinfo@gmail.com

ISO 17025
CALIBRATION DATA

CERTIFICATE OF CALIBRATION

Certificate No. : SP24-028

Page 1 of 5

Customer : United Analyst and Engineering Consultant Co.,Ltd. (Head Office)

Address : 3 Soi Udomsuk 41, Sukhumvit Road, Bangchak, Phrakhanong, Bangkok 10260

Location of calibration : Laboratory 315

Equipment : UV-Vis Spectrophotometer

Manufacturer : HITACHI

Model : U-5100

Serial No. : 23A4-008

ID No. : UAE.WAS.010/2567

Received Date : 10 September 2024

Calibration Date : 10 September 2024

Issue Date : 13 September 2024

Condition Instrument : Good

Calibrated by :

(Mr.Tanawut Rittidach)

Technical Manager

Approved by :

(Ms.Chonthicha Sangnern)

Quality Manager

The calibration result is applied only to the above calibrated item and was found accurate as shown on date and place of calibration only.

The measurement capability of the laboratory and its traceability to recognized national standards and to the unit 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 DQE Services Co., Ltd.

เอกสารไม่ควบคุม

FM-708-02 R01 1/11/2021

DQE Services Co.,Ltd.

DQE Services

32 Soi Ladprao-Wanghin 55, Ladprao-Wanghin Rd., Ladprao, Bangkok 10230

Phone : +66 (0)2 538 2054, Email : dqeservicesinfo@gmail.com

ISO 17025
CALIBRATION DATA

REPORT OF CALIBRATION

Certificate No. : SP24-028

Page 2 of 5

Environment Condition : Ambient Temperature 25 ± 5 °C

Relative humidity 55 ± 20 %RH

Calibration method : In-house method CP-01 Based on ASTM E275-08

Certified Reference Materials :

Material	Serial No.	Certificate No.	Due date
Absorbance Standard set	25760	115663	25 October 2025
Absorbance Standard set	25757	115638	25 October 2025
Wavelength Standard set	25806	115657	25 October 2025
Wavelength Standard set	25758	115665	25 October 2025

Traceability : This certification is traceable to the International System of Unit maintained at National - Institute of Standards and Technology (NIST) through Sarna Scientific Limited

Spectral Band Width of UUC : 5.0 nm.

Scan Speed of UUC : 40

Scan Interval of UUC : 0.1 nm.

Resolution of UUC : Photometric 0.001 Abs.

Wavelength 0.1 nm.

DQE Services Co.,Ltd.

DQE Services

32 Soi Ladprao-Wanghin 55, Ladprao-Wanghin Rd., Ladprao, Bangkok 10230

Phone : +66 (0)2 538 2054, Email : dqeservicesinfo@gmail.com

ISO 17025
CALIBRATION DATA

REPORT OF CALIBRATION

Certificate No. : SP24-028

Page 3 of 5

Calibration Results : Without adjustment

Photometric Accuracy :

Wavelength (nm.)	CRMs Values (Abs)	UUC Reading (Abs)	Correction (Abs)	Uncertainty (Abs)	Coverage factor k
420	0.0000	0.000	0.0000	0.0028	2.00
	0.5780	0.575	0.0030	0.0031	2.00
	1.0484	1.044	0.0044	0.0029	2.00
	2.1876	2.190	-0.0024	0.0075	2.00
440	0.0000	0.000	0.0000	0.0028	2.00
	0.5595	0.557	0.0025	0.0034	2.00
	1.0239	1.021	0.0029	0.0035	2.00
	2.1230	2.121	0.0020	0.0079	2.00
465	0.0000	0.000	0.0000	0.0028	2.00
	0.5230	0.519	0.0040	0.0029	2.00
	0.9633	0.961	0.0023	0.0028	2.00
	1.9753	1.975	0.0003	0.0070	2.00
546.1	0.0000	0.000	0.0000	0.0028	2.00
	0.5181	0.515	0.0031	0.0031	2.00
	1.0002	0.997	0.0032	0.0033	2.00
	1.9973	1.996	0.0013	0.0085	2.00
590	0.0000	0.000	0.0000	0.0028	2.00
	0.5517	0.549	0.0027	0.0030	2.00
	1.0803	1.078	0.0023	0.0029	2.00
	2.0373	2.031	0.0063	0.0081	2.00
635	0.0000	0.000	0.0000	0.0028	2.00
	0.5591	0.557	0.0021	0.0031	2.00
	1.0518	1.049	0.0028	0.0029	2.00
	1.9274	1.923	0.0044	0.0080	2.00

เอกสารไม่ควบคุม

FM-708-02 R01 1/11/2021

DQE Services Co.,Ltd.

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ISO 17025
CALIBRATION DATA

REPORT OF CALIBRATION

Certificate No. : SP24-028

Page 4 of 5

Photometric Accuracy :

Wavelength (nm.)	CRMs Values (Abs)	UUC Reading (Abs)	Correction (Abs)	Uncertainty (Abs)	Coverage factor k
235	0.0000	0.000	0.0000	0.0050	2.00
	0.7469	0.743	0.0039	0.0056	2.00
257	0.0000	0.000	0.0000	0.0050	2.00
	0.8674	0.862	0.0054	0.0059	2.00
313	0.0000	0.000	0.0000	0.0050	2.00
	0.2919	0.291	0.0009	0.0051	2.00
350	0.0000	0.000	0.0000	0.0050	2.00
	0.6430	0.639	0.0040	0.0055	2.00

เอกสารไม่ควบคุม

FM-708-02 R01 1/11/2021

REPORT OF CALIBRATION

Certificate No. : SP24-028

Page 5 of 5

Wavelength Accuracy :

CRMs Values (nm.)	UUC Reading (nm.)	Correction (nm.)	Uncertainty (nm.)	Coverage factor <i>k</i>
241.00	240.4	0.60	0.18	2.00
279.30	278.7	0.60	0.18	2.00
288.90	288.5	0.40	0.18	2.00
334.50	334.2	0.30	0.18	2.00
361.40	361.1	0.30	0.18	2.00
418.40	418.0	0.40	0.18	2.00
447.20	446.7	0.50	0.18	2.00
459.30	459.6	-0.30	0.18	2.00
537.00	536.6	0.40	0.18	2.00
638.00	637.4	0.60	0.18	2.00
441.29	440.8	0.49	0.18	2.00
479.88	479.6	0.28	0.18	2.00
513.75	513.5	0.25	0.18	2.00
528.59	528.6	-0.01	0.18	2.00
575.10	574.9	0.20	0.18	2.00
585.56	585.3	0.26	0.20	2.00
684.70	684.1	0.60	0.18	2.00
740.51	740.0	0.51	0.20	2.00
747.61	747.2	0.41	0.18	2.00
807.04	806.3	0.74	0.18	2.00
879.68	878.9	0.78	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%

- End of Certificate -

เอกสารไม่ควบคุม

FM-708-02 R01 1/11/2021

ภาคผนวก ฉ

หนังสืออนุญาตขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

บริษัท อินทิเกรตเต็ด รีเสิร์ช เซ็นเตอร์ จำกัด



ที่ อก ๐๓๒๐/๑๗๐๓๒

กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท
เขตราชเทวี กรุงเทพฯ ๑๐๔๐๐

๒๒ พฤศจิกายน ๒๕๖๕

เรื่อง ต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

เรียน กรรมการผู้จัดการ บริษัท อินทิเกรตเต็ด รีเสิร์ช เซ็นเตอร์ จำกัด

อ้างถึง คำขอต่ออายุของห้องปฏิบัติการวิเคราะห์เอกชน ลงวันที่ ๕ ตุลาคม ๒๕๖๕

สิ่งที่ส่งมาด้วย เอกสารแนบท้ายหนังสือรับต่ออายุขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน
บริษัท อินทิเกรตเต็ด รีเสิร์ช เซ็นเตอร์ จำกัด จำนวน ๓ แผ่น

ตามหนังสือที่อ้างถึง บริษัท อินทิเกรตเต็ด รีเสิร์ช เซ็นเตอร์ จำกัด ขอต่ออายุหนังสือ
รับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ว-๑๙๙ สถานที่ตั้งเลขที่ ๑๒๒ หมู่ที่ ๒ ตำบลท่าตูม
อำเภอศรีมหาโพธิ จังหวัดปราจีนบุรี ต่อกรมโรงงานอุตสาหกรรม นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้บริษัท อินทิเกรตเต็ด รีเสิร์ช เซ็นเตอร์ จำกัด
ต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน โดยมีองค์ประกอบดังนี้

ก. ผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์

๑) นางสาววิไลรัตน์ เกียรติธินชัย	ทะเบียนเลขที่ ว-๑๙๙-ค-๐๐๐๑
๒) นางสาวทิติยา นันหมื่น	ทะเบียนเลขที่ ว-๑๙๙-ค-๐๐๐๒
๓) นางวีราภรณ์ ผลเจริญ	ทะเบียนเลขที่ ว-๑๙๙-ค-๐๐๐๓

ข. เจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์

๑) นายไกรวิชญ์ แสงแก้ว	ทะเบียนเลขที่ ว-๑๙๙-จ-๐๐๐๑
๒) นางสาวณัฐนันท์ สักวาลวงษ์	ทะเบียนเลขที่ ว-๑๙๙-จ-๐๐๐๒
๓) นางสาวอนันตพร งามสง่า	ทะเบียนเลขที่ ว-๑๙๙-จ-๐๐๐๓
๔) นางสาวหนึ่งฤทัย ออมบาลี	ทะเบียนเลขที่ ว-๑๙๙-จ-๐๐๐๔
๕) นางสาวแววตา คำสา	ทะเบียนเลขที่ ว-๑๙๙-จ-๐๐๐๕
๖) นายจักรีชัย อินตะ	ทะเบียนเลขที่ ว-๑๙๙-จ-๐๐๐๖
๗) นางสาวชนิกานต์ แสนสุข	ทะเบียนเลขที่ ว-๑๙๙-จ-๐๐๐๗

ค. ขอบข่ายสารมลพิษที่ได้รับขึ้นทะเบียนให้วิเคราะห์ในน้ำเสีย จำนวน ๒๓ รายการ น้ำใต้ดิน
จำนวน ๑๒ รายการ และสิ่งปฏิกูลหรือวัสดุที่ไม่ใช่แล้ว จำนวน ๑๐ รายการ รวมทั้งสิ้นจำนวน ๔๕ รายการ
ตามสิ่งที่ส่งมาด้วย

-๒-

หนังสือฉบับนี้จะหมดอายุในวันที่ ๑๘ พฤศจิกายน ๒๕๖๘ หากประสงค์จะต่ออายุหนังสือ
รับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน ให้อื่นคำขอต่ออายุพร้อมเอกสารประกอบคำขอต่อกรมโรงงาน
อุตสาหกรรมภายใน ๓๐ วัน ก่อนวันสิ้นอายุของหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน ซึ่งคำขอ
ต่ออายุดังกล่าวขอรับได้ที่กรมโรงงานอุตสาหกรรม ทั้งนี้ สามารถยื่นคำขอผ่านระบบอิเล็กทรอนิกส์ได้ทั้งหน้า
เว็บไซต์กรมโรงงานอุตสาหกรรม ตาม QR Code ท้ายหนังสือนี้

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

(นายทวี อำพาพันธ์)

ผู้อำนวยการศูนย์วิจัยและเตือนภัยมลพิษโรงงานภาคตะวันออก
ปฏิบัติราชการแทนอธิบดีกรมโรงงานอุตสาหกรรม

ศูนย์วิจัยและเตือนภัยมลพิษโรงงานภาคตะวันออก
โทร. ๐ ๓๓๑๓๓ ๖๐๕๙ ต่อ ๕๐๐๑-๒
ไปรษณีย์อิเล็กทรอนิกส์ eirw@diw.mail.go.th



ยื่นคำขอผ่านระบบอิเล็กทรอนิกส์

หนังสือ...



“อุตสาหกรรมก้าวไกล ประเทศไทยก้าวหน้า ร่วมกันพัฒนา อุตสาหกรรมสีเขียว”



เอกสารแนบท้ายหนังสือรับต่ออายุขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

บริษัท อินทีเกรตเต็ด รีเสิร์ช เซ็นเตอร์ จำกัด

ที่ อก ๐๓๒๐/๑๗๐๓๒

เลขทะเบียน ๖-๑๙๙

ลงวันที่ ๒๒ พฤศจิกายน ๒๕๖๕

ขอขยายสารมลพิษที่ได้รับขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๔๕ รายการ

น้ำเสีย จำนวน 23 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Arsenic	Digestion, Inductively Coupled Plasma Method ^[1]
2	Barium	Digestion, Inductively Coupled Plasma Method ^[1]
3	Biochemical Oxygen Demand	1) 5-Day BOD Test, Azide Modification Method ^[1] 2) 5-Day BOD Test, Membrane Electrode Method ^[1]
4	Cadmium	Digestion, Inductively Coupled Plasma Method ^[1]
5	Chemical Oxygen Demand	Closed Reflux, Colorimetric Method ^[1]
6	Color	ADMI Weighted – Ordinate Spectrophotometric Method ^[1]
7	Copper	Digestion, Inductively Coupled Plasma Method ^[1]
8	Free Chlorine	Iodometric Method ^[1]
9	Hexavalent Chromium	Filtration, Colorimetric Method ^[1]
10	Lead	Digestion, Inductively Coupled Plasma Method ^[1]
11	Manganese	Digestion, Inductively Coupled Plasma Method ^[1]
12	Nickel	Digestion, Inductively Coupled Plasma Method ^[1]
13	Oil and Grease	Liquid-Liquid, Partition-Gravimetric Method ^[1]
14	pH	Electrometric Method ^[1]
15	Selenium	Digestion, Inductively Coupled Plasma Method ^[1]
16	Sulfide	ZnS Precipitation, Iodometric Method ^[1]
17	Temperature	Field Method ^[1]
18	Total Chromium	Digestion, Inductively Coupled Plasma Method ^[1]
19	Total Dissolved Solids	Dried at 180 °C ^[1]
20	Total Kjeldahl Nitrogen	Macro Kjeldahl Method ^[1]
21	Total Suspended Solids	Dried at 103-105 °C ^[1]
22	Trivalent Chromium	Digestion, Inductively Coupled Plasma Method Filtration, Colorimetric Method, Calculation ^[1]
23	Zinc	Digestion, Inductively Coupled Plasma Method ^[1]

น้ำได้ดิน...

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น้ำได้ดิน จำนวน 12 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Arsenic	Digestion, Inductively Coupled Plasma Method ^[1]
2	Barium	Digestion, Inductively Coupled Plasma Method ^[1]
3	Cadmium	Digestion, Inductively Coupled Plasma Method ^[1]
4	Chromium	Digestion, Inductively Coupled Plasma Method ^[1]
5	Hexavalent Chromium	Filtration, Colorimetric Method ^[1]
6	Lead	Digestion, Inductively Coupled Plasma Method ^[1]
7	Manganese	Digestion, Inductively Coupled Plasma Method ^[1]
8	Nickel	Digestion, Inductively Coupled Plasma Method ^[1]
9	pH	Electrometric Method ^[1]
10	Selenium	Digestion, Inductively Coupled Plasma Method ^[1]
11	Trivalent Chromium	Inductively Coupled Plasma Method; Filtration, Colorimetric Method; Calculation ^[1]
12	Zinc	Digestion, Inductively Coupled Plasma Method ^[1]

สิ่งปฏิกูลหรือวัสดุที่ไม่ใช้แล้ว จำนวน 10 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Arsenic	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[2,4,5] 2) Digestion, Inductively Coupled Plasma Method ^[3,5]
2	Barium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[2,4,5] 2) Digestion, Inductively Coupled Plasma Method ^[3,5]
3	Cadmium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[2,4,5] 2) Digestion, Inductively Coupled Plasma Method ^[3,5]
4	Chromium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[2,4,5] 2) Digestion, Inductively Coupled Plasma Method ^[3,5]
5	Lead	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[2,4,5] 2) Digestion, Inductively Coupled Plasma Method ^[3,5]
6	Manganese	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[2,4,5] 2) Digestion, Inductively Coupled Plasma Method ^[3,5]

7 Nickel...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
7	Nickel	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[2,4,5]
8	pH	2) Digestion, Inductively Coupled Plasma Method ^[3,5] Electrometric Method ^[6]
9	Selenium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[2,4,5]
10	Zinc	2) Digestion, Inductively Coupled Plasma Method ^[3,5] 1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[2,4,5] 2) Digestion, Inductively Coupled Plasma Method ^[3,5]

เอกสารอ้างอิง

1. APHA, AWWA, WEF. **Standard Methods for the Examination of Water and Wastewater**. 23rd ed. Washington, DC : APHA, 2017
2. กระทรวงอุตสาหกรรม. ประกาศกระทรวงอุตสาหกรรม, พ.ศ. 2548 เรื่อง การกําจัดสิ่งปฏิกูลหรือวัสดุที่ไม่ใช้แล้ว. ราชกิจจานุเบกษา. 25 มกราคม 2549, เล่มที่ 123 ตอนพิเศษ 11ง.
3. 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.
4. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. **SW-846**, 2006.
5. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. **Inductively Coupled Plasma – optical Emission Spectrometry. SW-846 Method 6010D**, 2018
6. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. **Solid and Waste pH. SW-846 Method 9045D**, 2004.



บริษัท ยูไนเต็ด แอนนาลิสต์ แอนด์ เอ็นจิเนียริง คอนสัลแตนท์ จำกัด



๒๕ กุมภาพันธ์ ๒๕๖๕

เรื่อง ยกเลิกบุคลากรของห้องปฏิบัติการวิเคราะห์

เรียน กรรมการผู้จัดการ บริษัท ยูโนเด็ค แอนนาลิสต์ แอนด์ เอ็นจิเนียริง คอนซัลแตนท์ จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และขอปิดสารบบของห้องปฏิบัติการวิเคราะห์เอกชน
ลงวันที่ ๑๘ กุมภาพันธ์ ๒๕๖๕ตามคำขอที่อ้างถึง บริษัท ยูโนเด็ค แอนนาลิสต์ แอนด์ เอ็นจิเนียริง คอนซัลแตนท์ จำกัด
ห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ๖-๑๕๕ สถานที่ตั้งเลขที่ ๓ ซอยอุดมสุข ๕๑ ถนนสุขุมวิท
แขวงบางจาก เขตพระโขนง กรุงเทพมหานคร ขอยกเลิกบุคลากร ความละเอียดแล้ว นั้นกรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้ออกเลิกเจ้าหน้าที่ห้องปฏิบัติการวิเคราะห์เอกชน
จำนวน ๓ ราย ได้แก่

- ๑) นายอภิสิทธิ์ ศรีคงแก้ว
- ๒) นางสาวนันทิศา พรมกัญญา
- ๓) นายภูวดล เข็มมา

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

รังสรวง
(นายธีรศักดิ์ อิศรางกูร ณ อยุธยา)
รองอธิบดี ปฏิบัติราชการแทน
อธิบดีกรมโรงงานอุตสาหกรรม

กองวิจัยและพัฒนาระบบผลิตพลังงาน

กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบผลิตภัณฑ์และทะเบียนห้องปฏิบัติการ

โทร. ๐ ๒๕๓๐ ๖๓๑๒ ต่อ ๒๑๐๓-๕

โทรสาร ๐ ๒๕๓๐ ๖๓๑๒ ต่อ ๒๑๕๙

ไปรษณีย์อิเล็กทรอนิกส์ saraband@dlw.mail.go.th



นางสาวกัญญา
ผู้อำนวยการกอง



"อุตสาหกรรมก้าวไกล ประเพณีไทยก้าวหน้า ร่วมกันพัฒนา อุตสาหกรรมสีเขียว"



๐๗ กุมภาพันธ์ ๒๕๖๕

เรื่อง ต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

เรียน กรรมการผู้จัดการ บริษัท ยูโนเด็ค แอนนาลิสต์ แอนด์ เอ็นจิเนียริง คอนซัลแตนท์ จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และขอปิดสารบบของห้องปฏิบัติการวิเคราะห์เอกชน
ลงวันที่ ๓ ธันวาคม ๒๕๖๓

- สิ่งที่ส่งมาด้วย ๑. รายชื่อผู้ควบคุมห้องปฏิบัติการวิเคราะห์เอกชน จำนวน ๔๐ ราย
๒. รายชื่อเจ้าหน้าที่ห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ๖-๑๕๕ สถานที่ตั้งเลขที่ ๓ ซอยอุดมสุข ๕๑
๓. ขอบข่ายสารบบผลิตภัณฑ์ที่ได้รับขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม

ตามคำขอที่อ้างถึง บริษัท ยูโนเด็ค แอนนาลิสต์ แอนด์ เอ็นจิเนียริง คอนซัลแตนท์ จำกัด ขอต่ออายุ
หนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ๖-๑๕๕ สถานที่ตั้งเลขที่ ๓ ซอยอุดมสุข ๕๑
ถนนสุขุมวิท แขวงบางจาก เขตพระโขนง กรุงเทพมหานคร ต่อกรมโรงงานอุตสาหกรรม นั้นกรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้ออกเลิก ยูโนเด็ค แอนนาลิสต์ แอนด์ เอ็นจิเนียริง
คอนซัลแตนท์ จำกัด ต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน โดยไม่ต้องประกาศดังนี้

- ก. ผู้ควบคุมห้องปฏิบัติการวิเคราะห์เอกชน จำนวน ๔๐ ราย ตามสิ่งที่ส่งมาด้วย ๑
- ข. เจ้าหน้าที่ห้องปฏิบัติการวิเคราะห์เอกชน จำนวน ๑๕๑ ราย ตามสิ่งที่ส่งมาด้วย ๒
- ค. ขอบข่ายสารบบผลิตภัณฑ์ที่ได้รับขึ้นทะเบียนให้วิเคราะห์ในน้ำ/น้ำเสีย น้ำดื่ม อากาศเสีย
สิ่งปฏิกูลหรือวัสดุที่ไม่ใช้แล้ว และอื่น ๆ ตามสิ่งที่ส่งมาด้วย ๓

หนังสือฉบับนี้จะหมดอายุในวันที่ ๒ กุมภาพันธ์ ๒๕๖๖ หากประสงค์จะต่ออายุหนังสือ
รับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน ให้ยื่นคำขอต่ออายุพร้อมเอกสารประกอบคำขอต่อกรมโรงงาน
อุตสาหกรรมภายใน ๖๐ วัน ก่อนวันสิ้นสุดของหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

รังสรวง
(นายธีรศักดิ์ อิศรางกูร ณ อยุธยา)
รองอธิบดี ปฏิบัติราชการแทน
อธิบดีกรมโรงงานอุตสาหกรรม

กองวิจัยและพัฒนาระบบผลิตพลังงาน

กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบผลิตภัณฑ์และทะเบียนห้องปฏิบัติการ

โทร. ๐ ๒๕๓๐ ๖๓๑๒ ต่อ ๒๑๐๓-๕

โทรสาร ๐ ๒๕๓๐ ๖๓๑๒ ต่อ ๒๑๕๙

ไปรษณีย์อิเล็กทรอนิกส์ saraband@dlw.mail.go.th



"อุตสาหกรรมก้าวไกล ประเพณีไทยก้าวหน้า ร่วมกันพัฒนา อุตสาหกรรมสีเขียว"



สิ่งที่ส่งมาด้วย ๑

เอกสารแนบท้ายหนังสือต่ออายุรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

บริษัท ยูโนเด็ค แอนนาลิสต์ แอนด์ เอ็นจิเนียริง คอนซัลแตนท์ จำกัด เลขทะเบียน ๖-๑๕๕

ที่ อก ๐๓๑๐(๑)/ ๑๔ ๕ ๕

ลงวันที่ ๐๗ กุมภาพันธ์ ๒๕๖๕

ก. ผู้ควบคุมห้องปฏิบัติการวิเคราะห์เอกชน จำนวน ๔๐ ราย

- ๑) นางสาวกัญชวรรณ ภัทธีรกุล
- ๒) นายณรงค์ นิมาชาติ
- ๓) นางสาวนันทิศา พรมกัญญา
- ๔) นายปิยะพัทธ์ สุทนต์นิสงฆ์
- ๕) นางสาวเบญจวรรณ วิไลทัย
- ๖) นายพนรัตน์ รัตนบุรีชัย
- ๗) นางสาวอริยวรรณ บุญลา
- ๘) นายสุวิทย์ จอดมอก
- ๙) นางสาวจิตติภา สมบูรณ์
- ๑๐) นางสาวบุษกร เลิศกาญจนา
- ๑๑) นางสาววิไลลักษณ์ ศรีสุข
- ๑๒) นายศิลา บรรจงใจรักษ์
- ๑๓) นายปฏิกรณ์ คณะนา
- ๑๔) นายธีรวัฒน์ ขมิ้ม
- ๑๕) นางสาวศิริพร ศรีประติษฐ์
- ๑๖) นางสาวศิริพร ธีระ
- ๑๗) นางสาวนพวรรณ สุวาทิน
- ๑๘) นายภูวนัย พานิชเลิศอำไพ
- ๑๙) นายณัฐวัฒน์ แสงสิทธิ์
- ๒๐) นายเอกรัตน์ ปะคำมินทร์
- ๒๑) นางสาวนิศาตร์ ศรีสกุลสิงห์โชค
- ๒๒) นางสาวเจษฎาภรณ์ ทำสะอาด
- ๒๓) นางสาวสุวรรณา คงทอง
- ๒๔) นางสาววรรณ พัดทองเย็น
- ๒๕) นายวิฑูรย์ โฉมแก้ว
- ๒๖) นายวิฑูรย์ เทพนคร
- ๒๗) นายอนุชา นวลดี
- ๒๘) นายกรวิทย์ เข้มศรีสกุล
- ๒๙) นายสุทธิชัย อรุณจันทร์
- ๓๐) นางสาวทัศนีย์ อ่อนคำ
- ๓๑) นางพิมพ์พรณ อ่อนสิน
- ๓๒) นายศุภณัฐ คุตตนาถอนัน
- ๓๓) นางสาวศิริภาพร เหมื่อน
- ๓๔) นางศิวิไลย์ ขำนิล
- ๓๕) นางสาวพรนภิกา ธีระจินดา

- ทะเบียนเลขที่ ๖-๑๕๕-ก-๐๐๐๑
- ทะเบียนเลขที่ ๖-๑๕๕-ก-๐๐๐๒
- ทะเบียนเลขที่ ๖-๑๕๕-ก-๐๐๐๓
- ทะเบียนเลขที่ ๖-๑๕๕-ก-๐๐๐๔
- ทะเบียนเลขที่ ๖-๑๕๕-ก-๐๐๐๕
- ทะเบียนเลขที่ ๖-๑๕๕-ก-๐๐๐๖
- ทะเบียนเลขที่ ๖-๑๕๕-ก-๐๐๐๗
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- ทะเบียนเลขที่ ๖-๑๕๕-ก-๐๐๓๙
- ทะเบียนเลขที่ ๖-๑๕๕-ก-๐๐๔๐



นางสาวกัญญา
ผู้อำนวยการกอง

๒๖) นายนาเคนทร์...

- ๒ -

- ๒๖) นายนาเคนทร์ พันธุ์ชาติกุล
- ๒๗) นายกานต์พงศ์ บุญพวง
- ๒๘) นางสาวธรรมา แก้วชัยนอก
- ๒๙) นางสาวอริน โชติเชษฐ์พิพัฒกุล
- ๓๐) นางณิศา แนน้อย

- ทะเบียนเลขที่ ๖-๑๕๕-ก-๐๐๔๐
- ทะเบียนเลขที่ ๖-๑๕๕-ก-๐๐๔๑
- ทะเบียนเลขที่ ๖-๑๕๕-ก-๐๐๔๒
- ทะเบียนเลขที่ ๖-๑๕๕-ก-๐๐๔๓
- ทะเบียนเลขที่ ๖-๑๕๕-ก-๐๐๔๔

๐๗/๒



นางสาวกัญญา
ผู้อำนวยการกอง

เอกสารแนบท้ายหนังสือคําสั่งฉบับที่ ๒๖๖/๒๕๖๒ เรื่อง ระเบียบการวิเคราะห์เอกสาร

บริษัท ยูนิเทค แอแนลิสต์ แอนด์ เอ็นจิเนียริง คอนซัลแตนท์ จำกัด เลขทะเบียน ๖-๑๕๕
ที่ ๑๓ ๐๓๑๐(๑) ๑๐ ๘ ๘ ลงวันที่ ๐๗ กุมภาพันธ์ ๒๕๖๕

ขอประชาสัมพันธ์ได้รับขึ้นทะเบียนจากกรมอุตสาหกรรม จำนวน ๑๕๗ รายการ

น้ำได้ดิน จำนวน 46 รายการ

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

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

น้ำได้ดิน...

น้ำได้ดิน จำนวน 126 รายการ

ลำดับ	สารเคมี	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/Mass Spectrometric Method ⁽⁴⁾
3	Aldrin	1) Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾ 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
4	Anthracene	1) Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾ 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
5	Antimony	Digestion, Inductively Coupled Plasma Method ⁽⁴⁾
6	Arsenic	1) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾
7	Atrazine	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
8	Barium	Digestion, Inductively Coupled Plasma Method ⁽⁴⁾
9	Benz(a)anthracene	1) Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾ 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
10	Benzene	Purge and Trap 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...

ลำดับ	สารเคมี	วิธีวิเคราะห์
14	Benzo(a)pyrene	1) Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾ 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
15	Benzo(g,h,i)perylene	1) Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾ 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
16	Beryllium	Digestion, Inductively Coupled Plasma 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...

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

43 Di-n-butyl phthalate...

ลำดับ	สารมลพิษ	วิธีวิเคราะห์
43	Di-n-butyl phthalate	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽¹⁾
44	1,2-Dichlorobenzene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽¹⁾
45	1,3-Dichlorobenzene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽¹⁾
46	1,4-Dichlorobenzene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽¹⁾
47	3,3'-Dichlorobenzidine	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽¹⁾
48	1,1-Dichloroethane	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽¹⁾
49	1,2-Dichloroethane	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽¹⁾
50	1,1-Dichloroethylene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽¹⁾
51	cis-1,2-Dichloroethylene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽¹⁾
52	trans-1,2-Dichloroethylene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽¹⁾
53	2,4-Dichlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽¹⁾
54	1,2-Dichloropropane	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽¹⁾
55	1,3-Dichloropropane	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽¹⁾
56	1,3-Dichloropropene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽¹⁾
57	Dieldrin	1) Liquid-Liquid Extraction, Gas Chromatographic Method ⁽¹⁾ 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽¹⁾
58	Diethyl phthalate	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽¹⁾
59	2,4-Dimethylphenol	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽¹⁾
60	2,4-Dinitrophenol	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽¹⁾

61 2,4-Dinitrotoluene...

ลำดับ	สารมลพิษ	วิธีวิเคราะห์
61	2,4-Dinitrotoluene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽¹⁾
62	2,6-Dinitrotoluene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽¹⁾
63	Di-n-Octyl phthalate	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽¹⁾
64	Endosulfan	1) Liquid-Liquid Extraction, Gas Chromatographic Method ⁽¹⁾ 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽¹⁾
65	Endrin	1) Liquid-Liquid Extraction, Gas Chromatographic Method ⁽¹⁾ 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽¹⁾
66	Ethylbenzene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽¹⁾
67	Fluoranthene	1) Liquid-Liquid Extraction, Gas Chromatographic Method ⁽¹⁾ 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽¹⁾
68	Fluorene	1) Liquid-Liquid Extraction, Gas Chromatographic Method ⁽¹⁾ 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽¹⁾
69	Heptachlor	1) Liquid-Liquid Extraction, Gas Chromatographic Method ⁽¹⁾ 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽¹⁾
70	Heptachlor epoxide	1) Liquid-Liquid Extraction, Gas Chromatographic Method ⁽¹⁾ 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽¹⁾
71	Hexachlorobenzene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽¹⁾
72	Hexachloro-1,3-butadiene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽¹⁾
73	n-Hexane	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽¹⁾

74 α -HCH...

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

87 Methylene chloride...

ลำดับ	สารเคมี	วิธีวิเคราะห์
87	Methylene chloride	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
88	2-Methylphenol	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
89	2-Methylnaphthalene	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, Inductively Coupled Plasma Method ⁽⁴⁾
93	Nitrobenzene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
94	N-Nitrosodiphenylamine	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
95	N-Nitrosodi-n-propylamine	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
96	Polychlorinated Biphenyls - PCB 1016 - PCB 1221 - PCB 1232 - PCB-1242 - PCB-1248 - PCB-1254 - PCB-1260	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..

ลำดับ	สารเคมี	วิธีวิเคราะห์
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⁾
108	Toxaphene	1) Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾ 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
109	TPH (C ₉ - C ₆)	1) Purge and Trap, Gas Chromatographic Method ^(12,22) 2) Purge and Trap, Gas Chromatographic/Mass spectrometric Method ^(12,23)
110	TPH (C _{9,8} - C ₁₀)	Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^(9,22)
111	TPH (C _{10,16} - C ₃₃)	Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^(9,22)
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..

ลำดับ	สารเคมี	วิธีวิเคราะห์
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	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, Inductively Coupled Plasma Method ⁽⁴⁾

ธาตุเคมี (ปล่องระบาย) จำนวน 25 รายการ

ลำดับ	สารเคมี	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⁾

Chromium (โคร)

ลำดับ	สารเคมี	วิธีวิเคราะห์
6	Chromium (โคร)	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 Method ⁽⁵⁾
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..

ลำดับ	สารมลพิษ	วิธีวิเคราะห์
23	Total Suspended Particulate	Isokinetic Sampling, Gravimetric Method ⁽³⁾
24	Vanadium	Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method ⁽³⁾
25	Xylene	1) Bag Sampling, Gas Chromatographic Method ⁽³⁾ 2) Adsorption Sampling, Gas Chromatographic Method ⁽³⁾

สิ่งปฏิกูลหรือวัสดุที่ไม่ใช้แล้ว จำนวน 35 รายการ

ลำดับ	สารมลพิษ	วิธีวิเคราะห์
1	Aldrin	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^(3,9,23) 2) Ultrasonic Extraction, Gas Chromatographic Method ^(10,23)
2	Antimony	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(3,6,14) 2) Digestion, Inductively Coupled Plasma Method ^(7,14)
3	Arsenic	1) Waste Extraction, Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^(3,6,14) 2) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(3,6,14) 3) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^(7,14) 4) Digestion, Inductively Coupled Plasma Method ^(7,14)
4	Barium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(3,6,14) 2) Digestion, Inductively Coupled Plasma Method ^(7,14)
5	Beryllium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(3,6,14) 2) Digestion, Inductively Coupled Plasma Method ^(7,14)
6	Cadmium	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^(3,6,15) 2) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(3,6,14) 3) Digestion, Flame Atomic Absorption Spectrometric Method ^(3,15) 4) Digestion, Inductively Coupled Plasma Method ^(7,14)
7	Chlordane	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^(3,9,23) 2) Ultrasonic Extraction, Gas Chromatographic Method ^(10,23)

8 Chromium...

ลำดับ	สารมลพิษ	วิธีวิเคราะห์
8	Chromium	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^(3,6,15) 2) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(3,6,14) 3) Digestion, Flame Atomic Absorption Spectrometric Method ^(7,15) 4) Digestion, Inductively Coupled Plasma Method ^(7,14)
9	Chromium (III)	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method; Waste Extraction, Colorimetric Method; Calculation ^(3,6,15,17) 2) Waste Extraction, Digestion, Inductively Coupled Plasma Method; Waste Extraction, Colorimetric Method; Calculation ^(3,6,14,17) 3) Digestion, Flame Atomic Absorption Spectrometric Method; Alkaline Digestion, Colorimetric Method; Calculation ^(7,15,17) 4) Digestion, Inductively Coupled Plasma Method; Alkaline Digestion, Colorimetric Method; Calculation ^(7,14,17)
10	Chromium (VI)	1) Waste Extraction, Colorimetric Method ^(3,17) 2) Alkaline Digestion, Colorimetric Method ^(8,17)
11	Cobalt	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(3,6,14) 2) Digestion, Inductively Coupled Plasma Method ^(7,14)
12	Copper	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^(3,6,15) 2) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(3,6,14) 3) Digestion, Flame Atomic Absorption Spectrometric Method ^(7,15) 4) Digestion, Inductively Coupled Plasma Method ^(7,14)
13	2,4-D	1) Waste Extraction, Gas Chromatographic Method ^(3,26) 2) Ultrasonic Extraction, Gas Chromatographic Method ^(10,26)
14	DDD	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^(3,9,23) 2) Ultrasonic Extraction, Gas Chromatographic Method ^(10,23)

15 DDE...

ลำดับ	สารมลพิษ	วิธีวิเคราะห์
15	DDE	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^(3,9,23) 2) Ultrasonic Extraction, Gas Chromatographic Method ^(10,23)
16	DDT	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^(3,9,23) 2) Ultrasonic Extraction, Gas Chromatographic Method ^(10,23)
17	Dieldrin	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^(3,9,23) 2) Ultrasonic Extraction, Gas Chromatographic Method ^(10,23)
18	Endrin	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^(3,9,23) 2) Ultrasonic Extraction, Gas Chromatographic Method ^(10,23)
19	Heptachlor	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^(3,9,23) 2) Ultrasonic Extraction, Gas Chromatographic Method ^(10,23)
20	Lead	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^(3,6,15) 2) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(3,6,14) 3) Digestion, Flame Atomic Absorption Spectrometric Method ^(7,15) 4) Digestion, Inductively Coupled Plasma Method ^(7,14)
21	Lindane	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^(3,9,23) 2) Ultrasonic Extraction, Gas Chromatographic Method ^(10,23)
22	Mercury	1) Waste Extraction, Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ^(3,18) 2) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(3,6,14) 3) Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ^(7,18) 4) Digestion, Inductively Coupled Plasma Method ^(7,14)

Mercury (ค่า)...

ลำดับ	สารมลพิษ	วิธีวิเคราะห์
22	Mercury (ค่า)	5) Thermal Decomposition Amalgamation and Atomic Absorption Spectrometric Method ⁽²⁰⁾
23	Methoxychlor	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^(3,9,23) 2) Ultrasonic Extraction, Gas Chromatographic Method ^(10,23)
24	Molybdenum	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(3,6,14) 2) Digestion, Inductively Coupled Plasma Method ^(7,14)
25	Nickel	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^(3,6,15) 2) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(3,6,14) 3) Digestion, Flame Atomic Absorption Spectrometric Method ^(7,15) 4) Digestion, Inductively Coupled Plasma Method ^(7,14)
26	Polychlorinated Biphenyls - Aroclor 1016 - Aroclor 1221 - Aroclor 1232 - Aroclor 1242 - Aroclor 1248 - Aroclor 1254 - Aroclor 1260 - 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	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^(3,9,26) 2) Ultrasonic Extraction, Gas Chromatographic Method ^(10,24)

Polychlorinated Biphenyls(ค่า)...

ลำดับ	สารมลพิษ	วิธีวิเคราะห์
27	Polychlorinated Biphenyls(พีบี) - 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',5,5',6'- Heptachlorobiphenyl - 2,2',3,4',5,5',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 ^(3,9,28) 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28) Electrometric Method ^(11,32)
28	pH	
29	Selenium	1) Waste Extraction, Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^(3,6,21) 2) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(3,6,14) 3) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^(7,21) 4) Digestion, Inductively Coupled Plasma Method ^(7,14)
30	Silver	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(3,6,14) 2) Digestion, Inductively Coupled Plasma Method ^(7,14)
31	Thallium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(3,6,14) 2) Digestion, Inductively Coupled Plasma Method ^(7,14)

32 Toxaphene...

ลำดับ	สารมลพิษ	วิธีวิเคราะห์
32	Toxaphene	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^(3,9,28) 2) Ultrasonic Extraction, Gas Chromatographic Method ^(10,28)
33	Trichloroethylene	1) Waste Extraction, Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(3,12,27) 2) Waste Extraction, Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method ^(3,11,27) 3) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(3,27) 4) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method ^(3,12,27)
34	Vanadium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(3,6,14) 2) Digestion, Inductively Coupled Plasma Method ^(7,14)
35	Zinc	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^(3,6,15) 2) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(3,6,14) 3) Digestion, Flame Atomic Absorption Spectrometric Method ^(7,15) 4) Digestion, Inductively Coupled Plasma Method ^(7,14)

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ลำดับ	สารมลพิษ	วิธีวิเคราะห์
1	Acenaphthene	1) Ultrasonic Extraction, Gas Chromatographic Method ^(10,28) 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28)
2	Acetone	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(12,27)
3	Aldrin	1) Ultrasonic Extraction, Gas Chromatographic Method ^(10,28) 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28)
4	Anthracene	1) Ultrasonic Extraction, Gas Chromatographic Method ^(10,28)

Anthracene (พีบี)...

ลำดับ	สารมลพิษ	วิธีวิเคราะห์
4	Anthracene (พีบี)	2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28)
5	Antimony	Digestion, Inductively Coupled Plasma Method ^(7,14)
6	Arsenic	1) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^(7,14) 2) Digestion, Inductively Coupled Plasma Method ^(7,14)
7	Atrazine	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28)
8	Barium	Digestion, Inductively Coupled Plasma Method ^(7,14)
9	Benz(a)anthracene	1) Ultrasonic Extraction, Gas Chromatographic Method ^(10,28) 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28)
10	Benzene	1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(12,27) 2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method ^(11,27)
11	Benzo(b)fluoranthene	1) Ultrasonic Extraction, Gas Chromatographic Method ^(10,28) 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28)
12	Benzo(k)fluoranthene	1) Ultrasonic Extraction, Gas Chromatographic Method ^(10,28) 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28)
13	Benzoic acid	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28)
14	Benzo(a)pyrene	1) Ultrasonic Extraction, Gas Chromatographic Method ^(10,28) 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28)
15	Benzo(g,h,i)perylene	1) Ultrasonic Extraction, Gas Chromatographic Method ^(10,28) 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28)
16	Beryllium	Digestion, Inductively Coupled Plasma Method ^(7,14)

17 Bis(2-chloroethyl)ether...

ลำดับ	สารมลพิษ	วิธีวิเคราะห์
17	Bis(2-chloroethyl)ether	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28)
18	Bis(2-ethylhexyl)phthalate	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28)
19	Bromodichloromethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(12,27)
20	Bromoform	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(12,27)
21	Butanol	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(12,27)
22	Butyl benzyl phthalate	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28)
23	Cadmium	1) Digestion, Flame Atomic Absorption Spectrometric Method ^(7,15) 2) Digestion, Inductively Coupled Plasma Method ^(7,14)
24	Carbazole	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28)
25	Carbon disulfide	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(12,27)
26	Carbon tetrachloride	1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(12,27) 2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method ^(11,27)
27	Chlordane	1) Ultrasonic Extraction, Gas Chromatographic Method ^(10,28) 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28)
28	p-Chloroaniline	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28)
29	Chlorobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(12,27)
30	Chlorodibromomethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(12,27)
31	Chloroform	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(12,27)
32	2-Chlorophenol	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28)

33 Chromium...

ลำดับ	สารมลพิษ	วิธีวิเคราะห์
33	Chromium	1) Digestion, Flame Atomic Absorption Spectrometric Method ^(7,13) 2) Digestion, Inductively Coupled Plasma Method ^(7,14)
34	Chromium (III)	1) Digestion, Flame Atomic Absorption Spectrometric Method; Alkaline Digestion, Colorimetric Method; Calculation ^(7,13,17) 2) Digestion, Inductively Coupled Plasma Method; Alkaline Digestion, Colorimetric Method; Calculation ^(7,13,17)
35	Chromium (VI)	Alkaline Digestion, Colorimetric Method ^(8,17)
36	Chrysene	1) Ultrasonic Extraction, Gas Chromatographic Method ^(10,23) 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28)
37	Cyanide	Extraction, Distillation, Colorimetric Method ^(29,30)
38	2,4-D	Ultrasonic Extraction, Gas Chromatographic Method ⁽²⁸⁾
39	DDD	1) Ultrasonic Extraction, Gas Chromatographic Method ^(10,23) 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28)
40	DDE	1) Ultrasonic Extraction, Gas Chromatographic Method ^(10,23) 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28)
41	DDT	1) Ultrasonic Extraction, Gas Chromatographic Method ^(10,23) 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28)
42	Dibenz(a,h)anthracene	1) Ultrasonic Extraction, Gas Chromatographic Method ^(10,23) 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28)
43	Di-n-butyl phthalate	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28)
44	1,2-Dichlorobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13,27)

45 1,3-Dichlorobenzene...

ลำดับ	สารมลพิษ	วิธีวิเคราะห์
45	1,3-Dichlorobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13,27)
46	1,4-Dichlorobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13,27)
47	3,3'-Dichlorobenzidine	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28)
48	1,1-Dichloroethane	1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13,27) 2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method ^(11,27)
49	1,2-Dichloroethane	1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13,27) 2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method ^(11,27)
50	1,1-Dichloroethylene	1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13,27) 2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method ^(11,27)
51	cis-1,2-Dichloroethylene	1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13,27) 2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method ^(11,27)
52	trans-1,2-Dichloroethylene	1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13,27) 2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method ^(11,27)
53	2,4-Dichlorophenol	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28)
54	1,2-Dichloropropane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13,27)
55	1,3-Dichloropropane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13,27)
56	1,3-Dichloropropene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13,27)
57	Dieldrin	1) Ultrasonic Extraction, Gas Chromatographic Method ^(10,23) 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28)

58 Diethyl phthalate...

ลำดับ	สารมลพิษ	วิธีวิเคราะห์
58	Diethyl phthalate	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28)
59	2,4-Dimethylphenol	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28)
60	2,4-Dinitrophenol	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28)
61	2,4-Dinitrotoluene	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28)
62	2,6-Dinitrotoluene	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28)
63	Di-n-Octyl phthalate	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28)
64	Endosulfan	1) Ultrasonic Extraction, Gas Chromatographic Method ^(10,23) 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28)
65	Endrin	1) Ultrasonic Extraction, Gas Chromatographic Method ^(10,23) 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28)
66	Ethylbenzene	1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13,27) 2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method ^(11,27)
67	Fluoranthene	1) Ultrasonic Extraction, Gas Chromatographic Method ^(10,23) 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28)
68	Fluorene	1) Ultrasonic Extraction, Gas Chromatographic Method ^(10,23) 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28)
69	Heptachlor	1) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28) 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28)
70	Heptachlor epoxide	1) Ultrasonic Extraction, Gas Chromatographic Method ^(10,23)

Heptachlor epoxide (ค่า)...

ลำดับ	สารมลพิษ	วิธีวิเคราะห์
70	Heptachlor epoxide (ค่า)	2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28)
71	Hexachlorobenzene	1) Ultrasonic Extraction, Gas Chromatographic Method ^(10,23) 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28)
72	Hexachloro-1,3-butadiene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13,27)
73	n-Hexane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13,27)
74	α-HCH	1) Ultrasonic Extraction, Gas Chromatographic Method ^(10,23) 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28)
75	β-HCH	1) Ultrasonic Extraction, Gas Chromatographic Method ^(10,23) 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28)
76	γ-HCH	1) Ultrasonic Extraction, Gas Chromatographic Method ^(10,23) 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28)
77	Hexachlorocyclopentadiene	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28)
78	Hexachloroethane	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28)
79	Indeno(1,2,3-cd)pyrene	1) Ultrasonic Extraction, Gas Chromatographic Method ^(10,23) 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28)
80	Isophorone	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28)
81	Lead	1) Digestion, Flame Atomic Absorption Spectrometric Method ^(7,13) 2) Digestion, Inductively Coupled Plasma Method ^(7,14)
82	Manganese	1) Digestion, Flame Atomic Absorption Spectrometric Method ^(7,13) 2) Digestion, Inductively Coupled Plasma Method ^(7,14)

83 Mercury...

ลำดับ	สารพิษ	วิธีวิเคราะห์
83	Mercury	1) Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ^[29] 2) Thermal Decomposition Amalgamation and Atomic Absorption Spectrometric Method ^[29]
84	Methanol	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[3,27]
85	Methoxychlor	1) Ultrasonic Extraction, Gas Chromatographic Method ^[10,23] 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^[10,28]
86	Methyl bromide	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[3,27]
87	Methylene chloride	1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[3,27] 2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method ^[11,27]
88	2-Methylphenol	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^[10,28]
89	2-Methylnaphthalene	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^[10,28]
90	Methyl tert-butyl ether	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[3,27]
91	Naphthalene	1) Ultrasonic Extraction, Gas Chromatographic Method ^[10,23] 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^[10,28]
92	Nickel	1) Digestion, Flame Atomic Absorption Spectrometric Method ^[7,15] 2) Digestion, Inductively Coupled Plasma Method ^[7,16]
93	Nitrobenzene	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^[10,28]
94	N-Nitrosodiphenylamine	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^[10,28]
95	N-Nitrosodi-n-propylamine	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^[10,28]
96	Polychlorinated Biphenyls - Aroclor 1016	1) Ultrasonic Extraction, Gas Chromatographic Method ^[10,28]

Polychlorinated Biphenyls(คปอ).

ลำดับ	สารมลพิษ	วิธีการตรวจ
96	<p>Polychlorinated Biphenyls(๕๑)</p> <p>- Aroclor 1221</p> <p>- Aroclor 1232</p> <p>- Aroclor 1242</p> <p>- Aroclor 1248</p> <p>- Aroclor 1254</p> <p>- Aroclor 1260</p> <p>Polychlorinated Biphenyls</p> <p>- 2-Chlorobiphenyl</p> <p>- 2,3-Dichlorobiphenyl</p> <p>- 2,2',5'-Trichlorobiphenyl</p> <p>- 2,4',5'-Trichlorobiphenyl</p> <p>- 2,2',3,5'-Tetrachlorobiphenyl</p> <p>- 2,2',5,5'-Tetrachlorobiphenyl</p> <p>- 2,3',4,4'-Tetrachlorobiphenyl</p> <p>- 2,2',3,4,5'-</p> <p>Pentachlorobiphenyl</p> <p>- 2,2',4,5,5'-</p> <p>Pentachlorobiphenyl</p> <p>- 2,3,3',4',6'-</p> <p>Pentachlorobiphenyl</p> <p>- 2,2',3,4,4',5'-</p> <p>Hexachlorobiphenyl</p> <p>- 2,2',3,4,5,5'-</p> <p>Hexachlorobiphenyl</p> <p>- 2,2',3,5,5',6'-</p> <p>Hexachlorobiphenyl</p> <p>- 2,2',4,4',5,5'-</p> <p>Hexachlorobiphenyl</p> <p>- 2,2',3,3',4,4',5'-</p> <p>Heptachlorobiphenyl</p> <p>- 2,2',3,4,4',5,5'-</p> <p>Heptachlorobiphenyl</p> <p>- 2,2',3,4,4',5',6'-</p> <p>Heptachlorobiphenyl</p> <p>- 2,2',3,4',5,5',6'-</p> <p>Heptachlorobiphenyl</p> <p>- 2,2',3,3',4,4',5,5',6'-</p> <p>Nonachlorobiphenyl</p>	<p>2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method^(10,28)</p> <p>Ultrasonic Extraction, Gas Chromatographic Method^(10,28)</p>

97 Pentachlorophenol.

ลำดับ	สารมลพิษ	วิธีวิเคราะห์
97	Pentachlorophenol	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28)
98	Phenanthrene	1) Ultrasonic Extraction, Gas Chromatographic Method ^(10,28) 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28)
99	Phenol	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28)
100	Pyrene	1) Ultrasonic Extraction, Gas Chromatographic Method ^(10,28) 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28)
101	Selenium	1) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^(7,21) 2) Digestion, Inductively Coupled Plasma Method ^(7,14)
102	Silver	Digestion, Inductively Coupled Plasma Method ^(7,14)
103	Styrene	1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13,27) 2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method ^(11,27)
104	1,1,2,2-Tetrachloroethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13,27)
105	Tetrachloroethylene	1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13,27) 2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method ^(11,27)
106	Toluene	1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13,27) 2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method ^(11,27)
107	Toxaphene	Ultrasonic Extraction, Gas Chromatographic Method ^(10,23)
108	TPH (C ₇ -C ₆)	1) Purge and Trap, Gas Chromatographic Method ^(13,22) 2) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13,22)
109	TPH (C ₁₀ -C ₁₆)	Ultrasonic Extraction, Gas Chromatographic Method ^(10,22)
110	TPH (C ₁₆ -C ₃₅)	Ultrasonic Extraction, Gas Chromatographic Method ^(10,22)

111 1,2,4-Trichlorobenzene.

ลำดับ	สารมลพิษ	วิธีวิเคราะห์
111	1,2,4-Trichlorobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(1,2,7)
112	1,1,1-Trichloroethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(1,2,7)
113	1,1,2-Trichloroethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(1,1,7)
114	Trichloroethylene	1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(1,2,7) 2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method ^(1,2,7)
115	2,4,5-Trichlorophenol	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(6,28)
116	2,4,6-Trichlorophenol	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(6,28)
117	1,3,5-Trimethylbenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(3,2,7)
118	Vanadium	Digestion, Inductively Coupled Plasma Method ^(7,14)
119	Vinyl acetate	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(1,2,7)
120	Vinyl chloride	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(1,2,7)
121	m-Xylene	1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(1,3,7) 2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method ^(1,2,7)
122	o-Xylene	1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(3,2,7) 2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method ^(1,2,7)
123	p-Xylene	1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(1,3,2,7) 2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method ^(1,2,7)
124	Xylene (Total)	1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(3,2,7) 2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method ^(1,2,7)

125 Zinc.

ลำดับ	สารเคมี	วิธีวิเคราะห์
125	Zinc	1) Digestion, Flame Atomic Absorption Spectrometric Method ^(7,13) 2) Digestion, Inductively Coupled Plasma Method ^(7,14)

เอกสารอ้างอิง

- กระทรวงอุตสาหกรรม. ประกาศกระทรวงอุตสาหกรรม, พ.ศ. 2549. เรื่อง กำหนดค่าปริมาณธาตุหนักที่เจือปนในอากาศที่ระบายออกจากรถยนต์ของรถยนต์ที่ใช้เครื่องยนต์เป็นเชื้อเพลิง.ราชกิจจานุเบกษา. 4 ธันวาคม 2549. เล่มที่ 123 ตอนพิเศษ 1254.
- สมาคมวิศวกรรมสิ่งแวดล้อมแห่งประเทศไทย. คู่มือวิเคราะห์น้ำเสีย. พิมพ์ครั้งที่ 4. กรุงเทพฯ: เรือนแก้วการพิมพ์, 2547.
- กระทรวงอุตสาหกรรม. ประกาศกระทรวงอุตสาหกรรม, พ.ศ. 2566. เรื่อง การจัดการสิ่งปฏิกูลหรือวัสดุที่ไม่ใช้แล้ว.ราชกิจจานุเบกษา. 31 พฤษภาคม 2566. เล่มที่ 140 ตอนพิเศษ 126 4.
- APHA, AWWA, WEF. Standard Methods for the Examination of Water and Wastewater. 24th ed. Washington, DC: APHA, 2023.
- United States Environmental Protection Agency. Standards of Performance for New Stationary Sources. 40 CFR 60. Appendix A, 2020.
- 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 3. 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, 2014.
- 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 for Volatile Organics in Soil and Waste Sample. SW-846 Method 5035A, 2000.
- United States...

- 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.
- United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Flame Atomic Absorption Spectrophotometry. SW-846 Method 7000B, 2007.
- United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Arsenic (Atomic Absorption, Gaseous Hydride). SW-846 Method 7061A, 1992.
- United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Chromium, Hexavalent (Colorimetric). SW-846 Method 7196A, 1992.
- 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.
- 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.
- 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.
- United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Selenium (Atomic Absorption, Borohydride Reduction). SW-846 Method 7742, 1994.
- United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Nonhalogenated Organics Using GC/FID. SW-846 Method 8015D, 2003.
- United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Organochlorine Pesticides by Gas Chromatography. SW-846 Method 8081B, 2007.
- 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.
- United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Organochlorine Pesticides by Gas Chromatography. SW-846 Method 8081B, 2007.
- United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Chlorinated Herbicides by GC Using Methylation or Pentafluorobenzoylation Derivatization. SW-846 Method 8151A, 1996.
- United States...

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

