

ภาคผนวก ค

ใบรับรองผลการตรวจวิเคราะห์

ภาคผนวก ค-1

ผลการตรวจวัดคุณภาพสิ่งแวดล้อม

คุณภาพอากาศในบรรยากาศทั่วไป



Analysis / Test Report



TESTING
No.0009

Client : PTTEP International Limited
222 Moo 1, Tambon Huakao, Amphur Singhanakorn, Songkhla Thailand 90280
P/O : 3450040615
Project Name : PSB Songkhla
Project Location :

Lot ID: 23111556
Date Received : Nov 11, 2023
Date Reported : Nov 17, 2023
Report Number : 2833533-1

Page 1 of 2

Sample Number 23111556-1
Sampled Date Nov 08, 2023
Sample Description Air Quality
Location บริเวณพื้นที่โครงการ (47N 672452 N, 800003 E)
Date Analysis Commenced Nov 13, 2023
Condition of Sample Drawn into one glass filter paper (8x10 inch) placed in plastic bag, one quartz filter paper (8x10 inch) placed in plastic bag and one 10-L air sampling bag
Barometric Pressure 756 mmHg
Atmospheric Temperature 31.0 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Particulate matter as PM 10	08/11/23 - 09/11/23	mg/m3	-	0.005	0.024	0.12	US EPA 40 CFR Part 50, Appendix J	NEB No.24 Bangkok	
Total Hydrocarbon *	09:00 AM - 10:00 AM	ppm	-	1.0	2.8	No Standard	Total Hydrocarbon Analyzer (FID)	-	Bangkok
Total Suspended Particulate	08/11/23 - 09/11/23	mg/m3	-	0.005	0.035	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24 Bangkok	

Guideline :
NEB No.24 : Notification of the National Environmental Board. No.24, 2004 (B.E.2547) dated September 22, 2004
Sampled By : Apiwat Chanta

Remark :
- LOD : Limit of Detection
- "<" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)
- Analyte(s) marked * is/are not included in scope of Accreditation ISO/IEC 17025.
- The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Approved by

Orawan R.

Orawan Rakyong
Scientist (3)

Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. No part of this report may be reproduced in any form without written consent from the laboratory. ALS Laboratory Group (Thailand) Co., Ltd. An ALS Limited Company. This report is not reproduced except in full.

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Analysis / Test Report



TESTING
No.0009

Client : PTTEP International Limited
222 Moo 1, Tambon Huakao, Amphur Singhanakorn, Songkhla Thailand 90280
P/O : 3450040615
Project Name : PSB Songkhla
Project Location :

Lot ID: 23111556
Date Received : Nov 11, 2023
Date Reported : Nov 17, 2023
Report Number : 2833533-1

Page 2 of 2

Sample Number 23111556-2
Sampled Date Nov 08, 2023
Sample Description Air Quality
Location บริเวณบ้านพักเจ้าหน้าที่สำนักงาน (47N 672452 N, 800003 E)
Date Analysis Commenced Nov 13, 2023
Condition of Sample Drawn into one glass filter paper (8x10 inch) placed in plastic bag, one quartz filter paper (8x10 inch) placed in plastic bag and one 10-L air sampling bag
Barometric Pressure 756 mmHg
Atmospheric Temperature 31.0 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Particulate matter as PM 10	08/11/23 - 09/11/23	mg/m3	-	0.005	0.025	0.12	US EPA 40 CFR Part 50, Appendix J	NEB No.24 Bangkok	
Total Hydrocarbon *	10:00 AM - 11:00 AM	ppm	-	1.0	3.1	No Standard	Total Hydrocarbon Analyzer (FID)	-	Bangkok
Total Suspended Particulate	08/11/23 - 09/11/23	mg/m3	-	0.005	0.032	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24 Bangkok	

Guideline :
NEB No.24 : Notification of the National Environmental Board. No.24, 2004 (B.E.2547) dated September 22, 2004
Sampled By : Apiwat Chanta

Remark :
- LOD : Limit of Detection
- "<" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)
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Analysis / Test Report

Client : PTTEP International Limited
222 Moo 1, Tambon Huakao, Amphur Singhanakorn, Songkhla Thailand 90280
P/O : 3450040615
Project Name : PSB Songkhla
Project Location :

Lot ID: 23111555
Date Received : Nov 11, 2023
Date Reported : Nov 16, 2023
Report Number: 2837436-1

Page 1 of 1

Sample Description Air Quality
Location บริเวณพื้นที่โครงการ (47N 672452 N, 800003 E)
Parameter Carbon monoxide (ppm)
Measurement Date Nov 08, 2023 - Nov 09, 2023
Measurement by Apiwat Chanta

Time	23111555-1 Nov 08, 2023	-	-	-	-	-	-	-	-
09:00 AM - 10:00 AM	2.4	-	-	-	-	-	-	-	-
10:00 AM - 11:00 AM	2.5	-	-	-	-	-	-	-	-
11:00 AM - 12:00 PM	2.4	-	-	-	-	-	-	-	-
12:00 PM - 01:00 PM	3.0	-	-	-	-	-	-	-	-
01:00 PM - 02:00 PM	3.2	-	-	-	-	-	-	-	-
02:00 PM - 03:00 PM	2.5	-	-	-	-	-	-	-	-
03:00 PM - 04:00 PM	2.5	-	-	-	-	-	-	-	-
04:00 PM - 05:00 PM	2.5	-	-	-	-	-	-	-	-
05:00 PM - 06:00 PM	2.5	-	-	-	-	-	-	-	-
06:00 PM - 07:00 PM	2.5	-	-	-	-	-	-	-	-
07:00 PM - 08:00 PM	2.6	-	-	-	-	-	-	-	-
08:00 PM - 09:00 PM	2.6	-	-	-	-	-	-	-	-
09:00 PM - 10:00 PM	2.6	-	-	-	-	-	-	-	-
10:00 PM - 11:00 PM	2.5	-	-	-	-	-	-	-	-
11:00 PM - 12:00 AM	2.6	-	-	-	-	-	-	-	-
12:00 AM - 01:00 AM	2.6	-	-	-	-	-	-	-	-
01:00 AM - 02:00 AM	2.6	-	-	-	-	-	-	-	-
02:00 AM - 03:00 AM	2.6	-	-	-	-	-	-	-	-
03:00 AM - 04:00 AM	2.6	-	-	-	-	-	-	-	-
04:00 AM - 05:00 AM	2.6	-	-	-	-	-	-	-	-
05:00 AM - 06:00 AM	2.7	-	-	-	-	-	-	-	-
06:00 AM - 07:00 AM	2.7	-	-	-	-	-	-	-	-
07:00 AM - 08:00 AM	2.7	-	-	-	-	-	-	-	-
08:00 AM - 09:00 AM	2.7	-	-	-	-	-	-	-	-
Average	2.6	-	-	-	-	-	-	-	-
1hr - Maximum	3.2	-	-	-	-	-	-	-	-
Standard 1hr - Average	30	-	-	-	-	-	-	-	-

Standard : Notification of the National Environmental Board. No.10, 1995 (B.E.2538).
Reference Method : EPA 40 CFR Part 50Appendix C

Approved by

Orawan R.

Orawan Rakyong
Scientist (3)

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Analysis / Test Report

Client : PTTEP International Limited
222 Moo 1, Tambon Huakao, Amphur Singhanakorn, Songkhla Thailand 90280
P/O : 3450040615
Project Name : PSB Songkhla
Project Location :

Lot ID: 23111555
Date Received : Nov 11, 2023
Date Reported : Nov 16, 2023
Report Number: 2837437-1

Page 1 of 1

Sample Description Air Quality
Location บริเวณบ้านพักเจ้าหน้าที่สถานศุลกากร (47N 672452 N, 800003 E)
Parameter Carbon monoxide (ppm)
Measurement Date Nov 08, 2023 - Nov 09, 2023
Measurement by Apiwat Chanta

Time	23111555-2 Nov 08, 2023	-	-	-	-	-	-	-	-
10:00 AM - 11:00 AM	0.2	-	-	-	-	-	-	-	-
11:00 AM - 12:00 PM	1.2	-	-	-	-	-	-	-	-
12:00 PM - 01:00 PM	0.7	-	-	-	-	-	-	-	-
01:00 PM - 02:00 PM	0.5	-	-	-	-	-	-	-	-
02:00 PM - 03:00 PM	0.4	-	-	-	-	-	-	-	-
03:00 PM - 04:00 PM	0.3	-	-	-	-	-	-	-	-
04:00 PM - 05:00 PM	0.2	-	-	-	-	-	-	-	-
05:00 PM - 06:00 PM	0.2	-	-	-	-	-	-	-	-
06:00 PM - 07:00 PM	0.2	-	-	-	-	-	-	-	-
07:00 PM - 08:00 PM	0.2	-	-	-	-	-	-	-	-
08:00 PM - 09:00 PM	0.2	-	-	-	-	-	-	-	-
09:00 PM - 10:00 PM	0.1	-	-	-	-	-	-	-	-
10:00 PM - 11:00 PM	0.1	-	-	-	-	-	-	-	-
11:00 PM - 12:00 AM	0.2	-	-	-	-	-	-	-	-
12:00 AM - 01:00 AM	0.3	-	-	-	-	-	-	-	-
01:00 AM - 02:00 AM	0.2	-	-	-	-	-	-	-	-
02:00 AM - 03:00 AM	0.2	-	-	-	-	-	-	-	-
03:00 AM - 04:00 AM	0.1	-	-	-	-	-	-	-	-
04:00 AM - 05:00 AM	0.1	-	-	-	-	-	-	-	-
05:00 AM - 06:00 AM	0.1	-	-	-	-	-	-	-	-
06:00 AM - 07:00 AM	0.1	-	-	-	-	-	-	-	-
07:00 AM - 08:00 AM	0.2	-	-	-	-	-	-	-	-
08:00 AM - 09:00 AM	0.2	-	-	-	-	-	-	-	-
09:00 AM - 10:00 AM	0.3	-	-	-	-	-	-	-	-
Average	0.3	-	-	-	-	-	-	-	-
1hr - Maximum	1.2	-	-	-	-	-	-	-	-
Standard 1hr - Average	30	-	-	-	-	-	-	-	-

Standard : Notification of the National Environmental Board. No.10, 1995 (B.E.2538).
Reference Method : EPA 40 CFR Part 50Appendix C

Approved by

Orawan R.

Orawan Rakyong
Scientist (3)

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ระดับเสียงทั่วไป



Analysis / Test Report

Client : PTTEP International Limited

222 Moo 1, Tambon Huakao, Amphur Singhanakorn, Songkhla Thailand 90280

P/O : 3450040615

Project Name : PSB Songkhla

Project Location :

Lot ID: 23111561

Date Received : Nov 11, 2023

Date Reported : Nov 17, 2023

Report Number: 2786923-1

Page 1 of 1

Sample Number 23111561-1
Parameter Noise (Leq 8 hrs.)
Location บริเวณพื้นที่โครงการ (47N 672422 E, 800027 N)
Measurement Date Nov 08, 2023
Measurement by Apiwat Chanta

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
09:00 AM - 10:00 AM	53.0	78.2	49.8
10:00 AM - 11:00 AM	54.4	70.2	50.2
11:00 AM - 12:00 PM	55.0	86.1	50.8
12:00 PM - 01:00 PM	54.1	72.3	50.7
01:00 PM - 02:00 PM	55.3	73.1	51.3
02:00 PM - 03:00 PM	53.7	70.8	50.7
03:00 PM - 04:00 PM	52.7	68.9	49.9
04:00 PM - 05:00 PM	54.8	70.3	51.3

Leq Average 8 hrs. (dB(A)) 54.2

Lmax (dB(A)) 86.1

L90 (dB(A))

Standard (dB(A)) 90 140

Reference Method : ISO1996-1 and 1996-2

Standard : ประกาศกระทรวงอุตสาหกรรม เรื่อง มาตรฐานการควบคุมความปลอดกับ
ในการประกอบกิจการโรงงานเกี่ยวกับสภาวะแวดล้อมในการทำงาน พ.ศ.๒๕๕๘

Technical Management

Orawan R.

Orawan Rak Yong
Scientist (3)

Approved by

Supt S

Supot Salamteh
Section Head

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S:\Reports_Air Noise.rpt (4:17PM)



Analysis / Test Report

Client : PTTEP International Limited

222 Moo 1, Tambon Huakao, Amphur Singhanakorn, Songkhla Thailand 90280

P/O : 3450040615

Project Name : PSB Songkhla

Project Location :

Lot ID: 23111559

Date Received : Nov 11, 2023

Date Reported : Nov 17, 2023

Report Number: 2786920-1

Page 1 of 1

Sample Number 23111559-1
Parameter Noise (Leq 24 hrs.)
Location บริเวณพื้นที่โครงการ (47N 672422 E, 800027 N)
Measurement Date Nov 08 - Nov 09, 2023
Measurement by Apiwat Chanta
Sound Level meter Serial No. 1120942

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
09:00 AM - 10:00 AM	53.0	78.2	49.8
10:00 AM - 11:00 AM	54.4	70.2	50.2
11:00 AM - 12:00 PM	55.0	86.1	50.8
12:00 PM - 01:00 PM	54.1	72.3	50.7
01:00 PM - 02:00 PM	55.3	73.1	51.3
02:00 PM - 03:00 PM	53.7	70.8	50.7
03:00 PM - 04:00 PM	52.7	68.9	49.9
04:00 PM - 05:00 PM	54.8	70.3	51.3
05:00 PM - 06:00 PM	54.3	76.3	48.0
06:00 PM - 07:00 PM	55.6	78.0	45.1
07:00 PM - 08:00 PM	49.5	74.8	43.9
08:00 PM - 09:00 PM	48.3	64.9	43.0
09:00 PM - 10:00 PM	45.9	69.2	41.8
10:00 PM - 11:00 PM	48.5	71.9	41.4
11:00 PM - 12:00 AM	44.4	61.6	41.6
12:00 AM - 01:00 AM	43.3	61.1	41.2
01:00 AM - 02:00 AM	43.9	62.5	39.2
02:00 AM - 03:00 AM	51.8	71.4	39.7
03:00 AM - 04:00 AM	44.7	57.1	41.4
04:00 AM - 05:00 AM	46.0	65.6	41.2
05:00 AM - 06:00 AM	47.0	63.6	42.2
06:00 AM - 07:00 AM	50.5	72.2	45.3
07:00 AM - 08:00 AM	52.6	70.3	47.6
08:00 AM - 09:00 AM	58.3	72.4	51.3

Leq Average 24 hrs. (dB(A)) 52.6

Lmax (dB(A)) 86.1

L90 (dB(A))

45.1

Ldn (dB(A)) 55.8

Standard (dB(A)) 70 115

Reference Method : ISO1996-1 and 1996-2

Standard : 1. ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 15 (พ.ศ. 2540) เรื่องกำหนดมาตรฐานระดับเสียงโดยทั่วไป
2. ประกาศกระทรวงอุตสาหกรรม เรื่องกำหนดค่าระดับเสียงการรบกวน และระดับเสียงที่เกิดจากการประกอบกิจการ
โรงงาน พ.ศ. 2548

Technical Management

Orawan R.

Orawan Rak Yong
Scientist (3)

Approved by

Supt S

Supot Salamteh
Section Head

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Analysis / Test Report

Client : PTTEP International Limited

222 Moo 1, Tambon Huakao, Amphur Singhanakorn, Songkhla Thailand 90280

P/O : 3450040615

Project Name : PSB Songkhla

Project Location :

Lot ID: 23111562

Date Received : Nov 11, 2023

Date Reported : Nov 17, 2023

Report Number: 2839522-1

Page 1 of 1

Sample Number 23111562-1
Parameter Noise (Leq 24 hrs.)
Location บริเวณบ้านพักเจ้าหน้าที่ตำรวจ (47N 672422 E, 800027 N)
Measurement Date Nov 08 - Nov 09, 2023
Measurement by Apiwat Chanta
Sound Level meter Serial No. 331094

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
09:00 AM - 10:00 AM	54.3	70.6	48.5
10:00 AM - 11:00 AM	53.7	69.3	48.3
11:00 AM - 12:00 PM	54.2	71.9	47.5
12:00 PM - 01:00 PM	54.5	76.0	48.6
01:00 PM - 02:00 PM	55.9	83.9	49.8
02:00 PM - 03:00 PM	57.5	79.0	49.1
03:00 PM - 04:00 PM	56.6	87.9	50.1
04:00 PM - 05:00 PM	56.9	83.5	51.3
05:00 PM - 06:00 PM	59.1	77.7	48.6
06:00 PM - 07:00 PM	57.4	87.6	45.4
07:00 PM - 08:00 PM	51.5	68.0	43.1
08:00 PM - 09:00 PM	50.5	71.1	40.0
09:00 PM - 10:00 PM	49.2	69.2	39.1
10:00 PM - 11:00 PM	48.7	68.1	39.1
11:00 PM - 12:00 AM	46.3	66.1	37.5
12:00 AM - 01:00 AM	45.2	62.7	35.7
01:00 AM - 02:00 AM	46.3	66.3	35.8
02:00 AM - 03:00 AM	45.5	68.5	36.7
03:00 AM - 04:00 AM	54.3	74.0	38.5
04:00 AM - 05:00 AM	51.3	72.0	41.3
05:00 AM - 06:00 AM	54.0	74.5	46.5
06:00 AM - 07:00 AM	56.7	74.8	51.6
07:00 AM - 08:00 AM	56.1	72.3	50.7
08:00 AM - 09:00 AM	56.1	75.6	50.2

Leq Average 24 hrs. (dB(A)) 54.5
Lmax (dB(A)) 87.9
L90 (dB(A)) 46.5
Ldn (dB(A)) 59.0
Standard (dB(A)) 70 115

Reference Method : ISO1996-1 and 1996-2

Standard : 1. ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 15 (พ.ศ. 2540) เรื่องกำหนดมาตรฐานระดับเสียงโดยทั่วไป
2. ประกาศกระทรวงอุตสาหกรรม เรื่องกำหนดค่าระดับเสียงการรบกวน และระดับเสียงที่เกิดจากการประกอบกิจการโรงงาน พ.ศ. 2548

Technical Management

Orawan R.
Orawan Rak Yong
Scientist (3)

Approved by

Supot S.
Supot Salamteh
Section Head

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Analysis / Test Report

Client : PTTEP International Limited

222 Moo 1, Tambon Huakao, Amphur Singhanakorn, Songkhla Thailand 90280

P/O : 3450040615

Project Name : PSB Songkhla

Project Location :

Lot ID: 23111562

Date Received : Nov 11, 2023

Date Reported : Nov 17, 2023

Report Number: 2839523-1

Page 1 of 1

Sample Number 23111562-2
Parameter Noise (Leq 24 hrs.)
Location บริเวณทางเข้าโครงการบ้านอาคารอเนก (47N 671996 E, 799890 N)
Measurement Date Nov 08 - Nov 09, 2023
Measurement by Apiwat Chanta
Sound Level meter Serial No. 331095

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
09:00 AM - 10:00 AM	64.9	87.5	56.4
10:00 AM - 11:00 AM	62.3	87.4	53.7
11:00 AM - 12:00 PM	58.9	78.7	50.0
12:00 PM - 01:00 PM	61.3	84.6	50.7
01:00 PM - 02:00 PM	62.7	87.7	53.9
02:00 PM - 03:00 PM	61.7	87.1	53.0
03:00 PM - 04:00 PM	60.3	82.4	51.9
04:00 PM - 05:00 PM	61.8	84.3	52.4
05:00 PM - 06:00 PM	58.0	75.3	50.2
06:00 PM - 07:00 PM	61.0	85.3	49.7
07:00 PM - 08:00 PM	53.9	72.5	47.9
08:00 PM - 09:00 PM	54.3	75.6	47.0
09:00 PM - 10:00 PM	56.1	79.0	44.2
10:00 PM - 11:00 PM	51.1	69.9	43.2
11:00 PM - 12:00 AM	50.2	72.6	42.7
12:00 AM - 01:00 AM	47.0	66.6	41.8
01:00 AM - 02:00 AM	49.0	80.5	41.2
02:00 AM - 03:00 AM	49.4	75.5	42.5
03:00 AM - 04:00 AM	47.6	70.6	41.6
04:00 AM - 05:00 AM	52.1	82.7	42.9
05:00 AM - 06:00 AM	55.5	77.8	45.3
06:00 AM - 07:00 AM	56.2	81.6	48.3
07:00 AM - 08:00 AM	62.0	81.9	53.0
08:00 AM - 09:00 AM	63.0	91.3	53.7

Leq Average 24 hrs. (dB(A)) 59.4
Lmax (dB(A)) 91.3
L90 (dB(A)) 48.3
Ldn (dB(A)) 61.5
Standard (dB(A)) 70 115

Reference Method : ISO1996-1 and 1996-2

Standard : 1. ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 15 (พ.ศ. 2540) เรื่องกำหนดมาตรฐานระดับเสียงโดยทั่วไป
2. ประกาศกระทรวงอุตสาหกรรม เรื่องกำหนดค่าระดับเสียงการรบกวน และระดับเสียงที่เกิดจากการประกอบกิจการโรงงาน พ.ศ. 2548

Technical Management

Orawan R.
Orawan Rak Yong
Scientist (3)

Approved by

Supot S.
Supot Salamteh
Section Head

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Analysis / Test Report

Client : PTTEP International Limited

222 Moo 1, Tambon Huakao, Amphur Singhanakorn, Songkhla Thailand 90280

P/O : 3450040615

Project Name : PSB Songkhla

Project Location:



TESTING

No.0009

Lot ID: 2399368

Date Received : Sep 07, 2023

Date Reported : Sep 22, 2023

Report Number : 2755732-1

Page 1 of 8

Sample Number	2399368-1
Sampled Date	Sep 07, 2023 10:50 AM
Sample Description	Seawater
Location	สถานีที่ 1 บริเวณพื้นที่ทางตอนน้ำขึ้น ด้านทิศแนวทางตอนน้ำขึ้น
Date Analysis Commenced	Sep 07, 2023
Condition of Sample	Contained in two BOD bottles, one amber glass bottle and five plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Microbiological Testing							
Fecal Coliform	CFU/100mL	-	-	18	≤100	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 9222 D	Bangkok
Total Coliform	MPN/100mL	-	-	70.0	≤1000	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 9221 B	Bangkok
Water Testing							
BOD (5 days at 20 degree C) *	mg/L	-	2.0	<2.0	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5210 B, part 4500 - O G	Songkhla
Dissolved Oxygen *	mg/L	-	0.1	6.0	≥4	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500-O (C)	Songkhla
Nitrate as N *	mg/L	0.003	0.02	0.05	≤0.06	Based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500-NO3 E	Bangkok
Oil & Grease *	mg/L	-	3	<3	No Standard	In-house method : STM 13-006 based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5520 B	Songkhla
pH at 25 degree C *	-	-	-	8.0	7.0-8.5	In-house method : STM 13-001 based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500 - H (B)	Songkhla
Phosphate as P *	mg/L	0.005	0.01	Not Detected	≤0.045	Based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500-P (E)	Bangkok

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Tuanjai Thangklang
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Analysis / Test Report

Client : PTTEP International Limited

222 Moo 1, Tambon Huakao, Amphur Singhanakorn, Songkhla Thailand 90280

P/O : 3450040615

Project Name : PSB Songkhla

Project Location:



TESTING

No.0009

Lot ID: 2399368

Date Received : Sep 07, 2023

Date Reported : Sep 22, 2023

Report Number : 2755732-1

Page 2 of 8

Sample Number	2399368-1
Sampled Date	Sep 07, 2023 10:50 AM
Sample Description	Seawater
Location	สถานีที่ 1 บริเวณพื้นที่ทางตอนน้ำขึ้น ด้านทิศแนวทางตอนน้ำขึ้น
Date Analysis Commenced	Sep 07, 2023
Condition of Sample	Contained in two BOD bottles, one amber glass bottle and five plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
Salinity *	ppt	-	-	31.1	Change from lower salinity not more than 10%	Based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2520 B	Songkhla
Sulfide as H2S *	mg/L	-	0.01	0.02	≤0.01	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500-S2 (D)	Bangkok
Temperature *	Degree C	-	-	30.0	Change from natural condition not more than 2 degree C	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2550 B	Songkhla
Total Suspended Solids *	mg/L	-	2	61	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 D	Songkhla
Transparency *	m	-	-	0.3	Change from Natural condition not more than 10% of the lowest transparency	Visual Method	Songkhla
Turbidity *	NTU	-	0.1	42.8	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2130 B	Songkhla

Guideline : Notification of the National Environmental Board, B.E.2564 : Coastal Water Quality Standard (Class 5)

Sampling By : Auit Aonsim , Woravut Deenuk

Remark :

- LOD : Limit of Detection
- "e" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)
- Analyte(s) marked * is/are not included in scope of Accreditation ISO/IEC 17025.
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Analysis / Test Report

Client : PTTEP International Limited
222 Moo 1, Tambon Huakao, Amphur Singhanakorn, Songkhla Thailand 90280
P/O : 3450040615
Project Name : PSB Songkhla
Project Location :



TESTING
No.0009

Lot ID: 2399368
Date Received : Sep 07, 2023
Date Reported : Sep 22, 2023
Report Number : 2755732-1

Page 3 of 8

Sample Number : 2399368-2
Sampled Date : Sep 07, 2023 10:30 AM
Sample Description : Seawater
Location : สถานี 2 บริเวณที่มีการเพาะเลี้ยงสัตว์น้ำในกระชัง ตำบลชุมชนบ้านเล
Date Analysis Commenced : Sep 07, 2023
Condition of Sample : Contained in two BOD bottles, one amber glass bottle and five plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Microbiological Testing							
Fecal Coliform	CFU/100mL	-	-	9	≤100	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 9222 D	Bangkok
Total Coliform	MPN/100mL	-	-	11.0	≤1000	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 9221 B	Bangkok
Water Testing							
BOD (5 days at 20 degree C) *	mg/L	-	2.0	<2.0	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5210 B, part 4500 - O G	Songkhla
Dissolved Oxygen *	mg/L	-	0.1	6.5	≥4	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500-O (C)	Songkhla
Nitrate as N *	mg/L	0.003	0.02	0.06	≤0.06	Based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500-NO3 E	Bangkok
Oil & Grease *	mg/L	-	3	<3	No Standard	In-house method : STM 13-006 based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5520 B	Songkhla
pH at 25 degree C *		-	-	8.1	7.0-8.5	In-house method : STM 13-001 based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500 - H (B)	Songkhla
Phosphate as P *	mg/L	0.005	0.01	Not Detected	≤0.045	Based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500-P (E)	Bangkok

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Analysis / Test Report

Client : PTTEP International Limited
222 Moo 1, Tambon Huakao, Amphur Singhanakorn, Songkhla Thailand 90280
P/O : 3450040615
Project Name : PSB Songkhla
Project Location :



TESTING
No.0009

Lot ID: 2399368
Date Received : Sep 07, 2023
Date Reported : Sep 22, 2023
Report Number : 2755732-1

Page 4 of 8

Sample Number : 2399368-2
Sampled Date : Sep 07, 2023 10:30 AM
Sample Description : Seawater
Location : สถานี 2 บริเวณที่มีการเพาะเลี้ยงสัตว์น้ำในกระชัง ตำบลชุมชนบ้านเล
Date Analysis Commenced : Sep 07, 2023
Condition of Sample : Contained in two BOD bottles, one amber glass bottle and five plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
Salinity *	ppt	-	-	31.5	Change from lower salinity not more than 10%	Based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2520 B	Songkhla
Sulfide as H ₂ S *	mg/L	-	0.01	0.02	≤0.01	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500-S2 (D)	Bangkok
Temperature *	Degree C	-	-	30.1	Change from natural condition not more than 2 degree C	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2550 B	Songkhla
Total Suspended Solids *	mg/L	-	2	7	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 D	Songkhla
Transparency *	m	-	-	0.6	Change from Natural condition not more than 10% of the lowest transparency	Visual Method	Songkhla
Turbidity *	NTU	-	0.1	5.42	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2130 B	Songkhla

Guideline : Notification of the National Environmental Board, B.E.2564 : Coastal Water Quality Standard (Class 5)

Sampling By : Autit Aoonsim , Woravut Deenuk

Remark :

- LOD : Limit of Detection
- "c" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)
- Analyte(s) marked * is/are not included in scope of Accreditation ISO/IEC 17025.
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Analysis / Test Report

Client : PTTEP International Limited

222 Moo 1, Tambon Huakao, Amphur Singhanakorn, Songkhla Thailand 90280

P/O : 3450040615

Project Name : PSB Songkhla

Project Location :



TESTING

No.0009

Lot ID: 2399368

Date Received : Sep 07, 2023

Date Reported : Sep 22, 2023

Report Number : 2755732-1

Page 5 of 8

Sample Number	2399368-3						
Sampled Date	Sep 07, 2023 10:12 AM						
Sample Description	Seawater						
Location	สถานีที่ 3 บริเวณแหล่งน้ำธรรมชาติ ด้านสะพานรับ-ส่งน้ำมันของ ปตท.						
Date Analysis Commenced	Sep 07, 2023						
Condition of Sample	Contained in two BOD bottles, one amber glass bottle and five plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)						
Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Microbiological Testing							
Fecal Coliform	CFU/100mL	-	-	<1	≤100	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 9222 D	Bangkok
Total Coliform	MPN/100mL	-	-	<1.8	≤1000	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 9221 B	Bangkok
Water Testing							
BOD (5 days at 20 degree C) *	mg/L	-	2.0	<2.0	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5210 B, part 4500 - O G	Songkhla
Dissolved Oxygen *	mg/L	-	0.1	6.5	≥4	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500-O (C)	Songkhla
Nitrate as N *	mg/L	0.003	0.02	0.06	≤0.06	Based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500-NO3 E	Bangkok
Oil & Grease *	mg/L	-	3	<3	No Standard	In-house method : STM 13-006 based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5520 B	Songkhla
pH at 25 degree C *	-	-	-	8.0	7.0-8.5	In-house method : STM 13-001 based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500 - H (B)	Songkhla
Phosphate as P *	mg/L	0.005	0.01	Not Detected	≤0.045	Based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500-P (E)	Bangkok

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Analysis / Test Report

Client : PTTEP International Limited

222 Moo 1, Tambon Huakao, Amphur Singhanakorn, Songkhla Thailand 90280

P/O : 3450040615

Project Name : PSB Songkhla

Project Location :



TESTING

No.0009

Lot ID: 2399368

Date Received : Sep 07, 2023

Date Reported : Sep 22, 2023

Report Number : 2755732-1

Page 6 of 8

Sample Number	2399368-3						
Sampled Date	Sep 07, 2023 10:12 AM						
Sample Description	Seawater						
Location	สถานีที่ 3 บริเวณแหล่งน้ำธรรมชาติ ด้านสะพานรับ-ส่งน้ำมันของ ปตท.						
Date Analysis Commenced	Sep 07, 2023						
Condition of Sample	Contained in two BOD bottles, one amber glass bottle and five plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)						
Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
Salinity *	ppt	-	-	31.0	Change from lower salinity not more than 10%	Based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2520 B	Songkhla
Sulfide as H2S *	mg/L	-	0.01	0.01	≤0.01	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500-S2 (D)	Bangkok
Temperature *	Degree C	-	-	30.1	Change from natural condition not more than 2 degree C	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2550 B	Songkhla
Total Suspended Solids *	mg/L	-	2	9	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 D	Songkhla
Transparency *	m	-	-	1.2	Change from Natural condition not more than 10% of the lowest transparency	Visual Method	Songkhla
Turbidity *	NTU	-	0.1	6.11	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2130 B	Songkhla

Guideline : Notification of the National Environmental Board, B.E.2564 : Coastal Water Quality Standard (Class 5)

Sampling By : Auit Aoonsim , Woravut Deenuk

Remark :

- LOD : Limit of Detection
- "<" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)
- Analyte(s) marked * is/are not included in scope of Accreditation ISO/IEC 17025.
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Analysis / Test Report

Client : PTTEP International Limited
222 Moo 1, Tambon Huakao, Amphur Singhanakorn, Songkhla Thailand 90280
P/O : 3450040615
Project Name : PSB Songkhla
Project Location :



TESTING
No.0009

Lot ID: 2399368
Date Received : Sep 07, 2023
Date Reported : Sep 22, 2023
Report Number : 2755732-1

Page 7 of 8

Sample Number	2399368-4						
Sampled Date	Sep 07, 2023 11:10 AM						
Sample Description	Seawater						
Location	สถานีที่ 4 บริเวณที่มีการเพาะเลี้ยงสัตว์น้ำ ด้านชุมชนฝั่งคลองน้ำจืด ปตท.						
Date Analysis Commenced	Sep 07, 2023						
Condition of Sample	Contained in two BOD bottles, one amber glass bottle and five plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)						
Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Microbiological Testing							
Fecal Coliform	CFU/100mL	-	-	11	≤100	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 9222 D	Bangkok
Total Coliform	MPN/100mL	-	-	17.0	≤1000	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 9221 B	Bangkok
Water Testing							
BOD (5 days at 20 degree C) *	mg/L	-	2.0	<2.0	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5210 B, part 4500 - O G	Songkhla
Dissolved Oxygen *	mg/L	-	0.1	6.4	≥4	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500-O (C)	Songkhla
Nitrate as N *	mg/L	0.003	0.02	0.04	≤0.06	Based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500-NO3 E	Bangkok
Oil & Grease *	mg/L	-	3	<3	No Standard	In-house method : STM 13-006 based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5520 B	Songkhla
pH at 25 degree C *		-	-	7.9	7.0-8.5	In-house method : STM 13-001 based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500 - H (B)	Songkhla
Phosphate as P *	mg/L	0.005	0.01	<0.01	≤0.045	Based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500-P (E)	Bangkok

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Analysis / Test Report

Client : PTTEP International Limited
222 Moo 1, Tambon Huakao, Amphur Singhanakorn, Songkhla Thailand 90280
P/O : 3450040615
Project Name : PSB Songkhla
Project Location :



TESTING
No.0009

Lot ID: 2399368
Date Received : Sep 07, 2023
Date Reported : Sep 22, 2023
Report Number : 2755732-1

Page 8 of 8

Sample Number	2399368-4						
Sampled Date	Sep 07, 2023 11:10 AM						
Sample Description	Seawater						
Location	สถานีที่ 4 บริเวณที่มีการเพาะเลี้ยงสัตว์น้ำ ด้านชุมชนฝั่งคลองน้ำจืด ปตท.						
Date Analysis Commenced	Sep 07, 2023						
Condition of Sample	Contained in two BOD bottles, one amber glass bottle and five plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)						
Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
Salinity *	ppt	-	-	31.7	Change from lower salinity not more than 10%	Based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2520 B	Songkhla
Sulfide as H ₂ S *	mg/L	-	0.01	0.02	≤0.01	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500-S2 (D)	Bangkok
Temperature *	Degree C	-	-	29.9	Change from natural condition not more than 2 degree C	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2550 B	Songkhla
Total Suspended Solids *	mg/L	-	2	9	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 D	Songkhla
Transparency *	m	-	-	0.4	Change from Natural condition not more than 10% of the lowest transparency	Visual Method	Songkhla
Turbidity *	NTU	-	0.1	9.21	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2130 B	Songkhla

Guideline : Notification of the National Environmental Board, B.E.2564 : Coastal Water Quality Standard (Class 5)

Sampling By : Autit Aoonsim , Woravut Deenuk

Remark :

- LOD : Limit of Detection
- "<" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)
- Analyte(s) marked * is/are not included in scope of Accreditation ISO/IEC 17025.
- The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

The above results are valid only for the analyzed/tested sample(s) as indicated in this report. No part of this report or certificate may be reproduced in any form without written consent from the Laboratory. ALS Laboratory Group (Thailand) strongly recommends that this report is not reproduced except in full.

Approved by

Tuanjai Thangklang
Manager

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Analysis / Test Report

Client : PTTEP International Limited
222 Moo 1, Tambon Huakao, Amphur Singhanakorn, Songkhla Thailand 90280
P/O : 3450040615
Project Name : PSB Songkhla
Project Location :



TESTING
No.0166

Lot ID: 23131382
Date Received : Dec 06, 2023
Date Reported : Dec 21, 2023
Report Number : 2831797-1

Page 1 of 8

Sample Number	23131382-1						
Sampled Date	Dec 06, 2023 11:10 AM						
Sample Description	Seawater						
Location	สถานีที่ 1 บริเวณพื้นที่ทางตอนใต้ ด้านทิศแนวรางรถไฟ						
Date Analysis Commenced	Dec 06, 2023						
Condition of Sample	Contained in two BOD bottles, one amber glass bottle and five plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)						

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Microbiological Testing							
Fecal Coliform	CFU/100mL	-	-	480	≤100	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 9222 D	Songkhla
Total Coliform	MPN/100mL	-	-	1100.0	≤1000	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 9221 B	Songkhla
Water Testing							
BOD (5 days at 20 degree C)	mg/L	-	2.0	<2.0	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5210 B, part 4500 - O G	Songkhla
Dissolved Oxygen *	mg/L	-	0.1	7.2	≥4	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500-O (C)	Songkhla
Nitrate as N *	mg/L	0.003	0.02	0.10	≤0.06	Based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500-NO3 E	Bangkok
Oil & Grease *	mg/L	-	3	3	No Standard	In-house method : STM 13-006 based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5520 B	Songkhla
pH at 25 degree C *	-	-	-	7.7	7.0-8.5	In-house method : STM 13-001 based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500 - H (B)	Songkhla
Phosphate as P *	mg/L	0.005	0.01	Not Detected	≤0.045	Based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500-P (E)	Bangkok

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Approved by

Ananta B.

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Analysis / Test Report

Client : PTTEP International Limited
222 Moo 1, Tambon Huakao, Amphur Singhanakorn, Songkhla Thailand 90280
P/O : 3450040615
Project Name : PSB Songkhla
Project Location :



TESTING
No.0166

Lot ID: 23131382
Date Received : Dec 06, 2023
Date Reported : Dec 21, 2023
Report Number : 2831797-1

Page 2 of 8

Sample Number	23131382-1						
Sampled Date	Dec 06, 2023 11:10 AM						
Sample Description	Seawater						
Location	สถานีที่ 1 บริเวณพื้นที่ทางตอนใต้ ด้านทิศแนวรางรถไฟ						
Date Analysis Commenced	Dec 06, 2023						
Condition of Sample	Contained in two BOD bottles, one amber glass bottle and five plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)						

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
Salinity *	ppt	-	-	2.2	Change from lower salinity not more than 10%	Based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2520 B	Songkhla
Sulfide as H ₂ S *	mg/L	-	0.01	0.07	≤0.01	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500-S2 (D)	Bangkok
Temperature *	Degree C	-	-	29.5	Change from natural condition not more than 2 degree C	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2550 B	Songkhla
Total Suspended Solids *	mg/L	-	2	50	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 D	Songkhla
Transparency *	m	-	-	0.4	Change from natural condition not more than 10% of the lowest transparency	Visual Method	Songkhla
Turbidity *	NTU	-	0.1	54.8	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2130 B	Songkhla

Guideline : Notification of the National Environmental Board, B.E.2564 : Coastal Water Quality Standard (Class 5)

Sampling By : Wuttichai Taucharoen , Woravut Deenuk

Remark :

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- "<" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)
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Approved by

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Analysis / Test Report

Client : PTTEP International Limited
222 Moo 1, Tambon Huakao, Amphur Singhanakorn, Songkhla Thailand 90280
P/O : 3450040615
Project Name : PSB Songkhla
Project Location :



TESTING
No.0166

Lot ID: 23131382
Date Received : Dec 06, 2023
Date Reported : Dec 21, 2023
Report Number : 2831797-1

Page 3 of 8

Sample Number	23131382-2
Sampled Date	Dec 06, 2023 10:50 AM
Sample Description	Seawater
Location	สถานีที่ 2 บริเวณที่มีการเพาะเลี้ยงสัตว์น้ำในกระชัง ตำบลชุมชนบ้านเล
Date Analysis Commenced	Dec 06, 2023
Condition of Sample	Contained in two BOD bottles, one amber glass bottle and five plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Microbiological Testing							
Fecal Coliform	CFU/100mL	-	-	1200	≤100	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 9222 D	Songkhla
Total Coliform	MPN/100mL	-	-	1700.0	≤1000	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 9221 B	Songkhla
Water Testing							
BOD (5 days at 20 degree C)	mg/L	-	2.0	<2.0	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5210 B, part 4500 - O G	Songkhla
Dissolved Oxygen *	mg/L	-	0.1	7.0	≥4	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500-O (C)	Songkhla
Nitrate as N *	mg/L	0.003	0.02	0.13	≤0.06	Based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500-NO3 E	Bangkok
Oil & Grease *	mg/L	-	3	3	No Standard	In-house method : STM 13-006 based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5520 B	Songkhla
pH at 25 degree C *	-	-	-	7.8	7.0-8.5	In-house method : STM 13-001 based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500 - H (B)	Songkhla
Phosphate as P *	mg/L	0.005	0.01	Not Detected	≤0.045	Based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500-P (E)	Bangkok

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Analysis / Test Report

Client : PTTEP International Limited
222 Moo 1, Tambon Huakao, Amphur Singhanakorn, Songkhla Thailand 90280
P/O : 3450040615
Project Name : PSB Songkhla
Project Location :



TESTING
No.0166

Lot ID: 23131382
Date Received : Dec 06, 2023
Date Reported : Dec 21, 2023
Report Number : 2831797-1

Page 4 of 8

Sample Number	23131382-2
Sampled Date	Dec 06, 2023 10:50 AM
Sample Description	Seawater
Location	สถานีที่ 2 บริเวณที่มีการเพาะเลี้ยงสัตว์น้ำในกระชัง ตำบลชุมชนบ้านเล
Date Analysis Commenced	Dec 06, 2023
Condition of Sample	Contained in two BOD bottles, one amber glass bottle and five plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
Salinity *	ppt	-	-	2.2	Change from lower salinity not more than 10%	Based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2520 B	Songkhla
Sulfide as H ₂ S *	mg/L	-	0.01	0.06	≤0.01	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500-S2 (D)	Bangkok
Temperature *	Degree C	-	-	29.0	Change from natural condition not more than 2 degree C	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2550 B	Songkhla
Total Suspended Solids *	mg/L	-	2	38	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 D	Songkhla
Transparency *	m	-	-	0.4	Change from Natural condition not more than 10% of the lowest transparency	Visual Method	Songkhla
Turbidity *	NTU	-	0.1	43.7	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2130 B	Songkhla

Guideline : Notification of the National Environmental Board, B.E.2564 : Coastal Water Quality Standard (Class 5)

Sampling By : Wutthichai Taucharoen , Woravut Deenuk

Remark :

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- "<" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)
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Analysis / Test Report

Client : PTTEP International Limited
222 Moo 1, Tambon Huakao, Amphur Singhanakorn, Songkhla Thailand 90280
P/O : 3450040615
Project Name : PSB Songkhla
Project Location :



TESTING
No.0166

Lot ID: 23131382
Date Received : Dec 06, 2023
Date Reported : Dec 21, 2023
Report Number : 2831797-1

Page 5 of 8

Sample Number 23131382-3
Sample Date Dec 06, 2023 10:20 AM
Sample Description Seawater
Location สถานี 3 บริเวณแหล่งน้ำธรรมชาติ ตำบลพวนริบ-สงขลานครินทร์ ปตท.
Date Analysis Commenced Dec 06, 2023
Condition of Sample Contained in two BOD bottles, one amber glass bottle and five plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Microbiological Testing							
Fecal Coliform	CFU/100mL	-	-	920	≤100	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 9222 D	Songkhla
Total Coliform	MPN/100mL	-	-	4900.0	≤1000	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 9221 B	Songkhla
Water Testing							
BOD (5 days at 20 degree C)	mg/L	-	2.0	<2.0	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5210 B, part 4500 - O G	Songkhla
Dissolved Oxygen *	mg/L	-	0.1	7.1	≥4	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500-NO3 E	Songkhla
Nitrate as N *	mg/L	0.003	0.02	0.13	≤0.06	Based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500-NO3 E	Bangkok
Oil & Grease *	mg/L	-	3	3	No Standard	In-house method : STM 13-006 based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5520 B	Songkhla
pH at 25 degree C *		-	-	7.8	7.0-8.5	In-house method : STM 13-001 based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500 - H (B)	Songkhla
Phosphate as P *	mg/L	0.005	0.01	Not Detected	≤0.045	Based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500-P (E)	Bangkok

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Analysis / Test Report

Client : PTTEP International Limited
222 Moo 1, Tambon Huakao, Amphur Singhanakorn, Songkhla Thailand 90280
P/O : 3450040615
Project Name : PSB Songkhla
Project Location :



TESTING
No.0166

Lot ID: 23131382
Date Received : Dec 06, 2023
Date Reported : Dec 21, 2023
Report Number : 2831797-1

Page 6 of 8

Sample Number 23131382-3
Sample Date Dec 06, 2023 10:20 AM
Sample Description Seawater
Location สถานี 3 บริเวณแหล่งน้ำธรรมชาติ ตำบลพวนริบ-สงขลานครินทร์ ปตท.
Date Analysis Commenced Dec 06, 2023
Condition of Sample Contained in two BOD bottles, one amber glass bottle and five plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
Salinity *	ppt	-	-	2.8	Change from lower salinity not more than 10%	Based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2520 B	Songkhla
Sulfide as H ₂ S *	mg/L	-	0.01	0.07	≤0.01	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500-S2 (D)	Bangkok
Temperature *	Degree C	-	-	29.0	Change from natural condition not more than 2 degree C	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2550 B	Songkhla
Total Suspended Solids *	mg/L	-	2	34	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 D	Songkhla
Transparency *	m	-	-	0.5	Change from Natural condition not more than 10% of the lowest transparency	Visual Method	Songkhla
Turbidity *	NTU	-	0.1	36.2	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2130 B	Songkhla

Guideline : Notification of the National Environmental Board, B.E.2564 : Coastal Water Quality Standard (Class 5)

Sampling By : Wuttichai Taucharoen , Woravut Deenuk

Remark :

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- "c" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)
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Analysis / Test Report

Client : PTTEP International Limited
222 Moo 1, Tambon Huakao, Amphur Singhanakorn, Songkhla Thailand 90280
P/O : 3450040615
Project Name : PSB Songkhla
Project Location :



TESTING
No.0166

Lot ID: 23131382
Date Received : Dec 06, 2023
Date Reported : Dec 21, 2023
Report Number : 2831797-1

Page 7 of 8

Sample Number 23131382-4
Sampled Date Dec 06, 2023 11:20 AM
Sample Description Seawater
Location สถานีที่ 4 บริเวณที่มีการเพาะเลี้ยงสัตว์น้ำ ด้านชุมชนฝั่งคลองน้ำมัน ปตท.
Date Analysis Commenced Dec 06, 2023
Condition of Sample Contained in two BOD bottles, one amber glass bottle and five plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Microbiological Testing							
Fecal Coliform	CFU/100mL	-	-	550	≤100	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 9222 D	Songkhla
Total Coliform	MPN/100mL	-	-	790.0	≤1000	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 9221 B	Songkhla
Water Testing							
BOD (5 days at 20 degree C)	mg/L	-	2.0	<2.0	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5210 B, part 4500 - O G	Songkhla
Dissolved Oxygen *	mg/L	-	0.1	7.0	≥4	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500 - O (C)	Songkhla
Nitrate as N *	mg/L	0.003	0.02	0.10	≤0.06	Based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500-NO3 E	Bangkok
Oil & Grease *	mg/L	-	3	3	No Standard	In-house method : STM 13-006 based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5520 B	Songkhla
pH at 25 degree C *	-	-	-	7.6	7.0-8.5	In-house method : STM 13-001 based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500 - H (B)	Songkhla
Phosphate as P *	mg/L	0.005	0.01	Not Detected	≤0.045	Based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500-P (E)	Bangkok

Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. No part of this report may be reproduced in any form without written consent from the laboratory. ALS Laboratory Group (Thailand) strongly recommends that this report is not reproduced except in full.

Approved by

Ananta Boonphet
Scientist (2)

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Analysis / Test Report

Client : PTTEP International Limited
222 Moo 1, Tambon Huakao, Amphur Singhanakorn, Songkhla Thailand 90280
P/O : 3450040615
Project Name : PSB Songkhla
Project Location :



TESTING
No.0166

Lot ID: 23131382
Date Received : Dec 06, 2023
Date Reported : Dec 21, 2023
Report Number : 2831797-1

Page 8 of 8

Sample Number 23131382-4
Sampled Date Dec 06, 2023 11:20 AM
Sample Description Seawater
Location สถานีที่ 4 บริเวณที่มีการเพาะเลี้ยงสัตว์น้ำ ด้านชุมชนฝั่งคลองน้ำมัน ปตท.
Date Analysis Commenced Dec 06, 2023
Condition of Sample Contained in two BOD bottles, one amber glass bottle and five plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
Salinity *	ppt	-	-	2.4	Change from lower salinity not more than 10‰	Based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2520 B	Songkhla
Sulfide as H ₂ S *	mg/L	-	0.01	0.09	≤0.01	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500-S2 (D)	Bangkok
Temperature *	Degree C	-	-	29.1	Change from natural condition not more than 2 degree C	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2550 B	Songkhla
Total Suspended Solids *	mg/L	-	2	56	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 D	Songkhla
Transparency *	m	-	-	0.3	Change from Natural condition not more than 10% of the lowest transparency	Visual Method	Songkhla
Turbidity *	NTU	-	0.1	58.7	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2130 B	Songkhla

Guideline : Notification of the National Environmental Board, B.E.2564 : Coastal Water Quality Standard (Class 5)

Sampling By : Wutthichai Taucharoen , Woravut Deenuk

Remark :

- LOD : Limit of Detection
- "<" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)
- Analyte(s) marked * is/are not included in scope of Accreditation ISO/IEC 17025.
- The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. No part of this report may be reproduced in any form without written consent from the laboratory. ALS Laboratory Group (Thailand) strongly recommends that this report is not reproduced except in full.

Approved by

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นิเวศวิทยาทางน้ำ



สถานีวิทยุประมงศรีราชา

101/12 หมู่ 9 ต. บางพระ

อ. ศรีราชา จ. ชลบุรี 20110

โทร./โทรสาร. (038) 311379

Client : PTTEP International Limited

Address : 222 Moo 1 Tambon Huakao, Amphur Singhanakorn, Songkhla, Thailand, 9028

Project Name : PSB Songkhla

รายงานผลการวิเคราะห์แพลงก์ตอนพืช

ตาราง ผลการวิเคราะห์แพลงก์ตอนพืช (เก็บตัวอย่างวันที่ 7 กันยายน 2566)

ชนิดแพลงก์ตอนพืช	ปริมาณแพลงก์ตอนพืช (หน่วยต่อลูกบาศก์เมตร)			
	2399371-1	2399371-2	2399371-3	2399371-4
Division Cyanophyta				
Class Cyanophyceae				
Order Nostocales				
Family Oscillatoriaceae				
1. <i>Oscillatoria</i> sp.	-	-	-	264,000
Family Nostocaceae				
2. <i>Pseudanabaena</i> sp.	26,000	53,000	-	158,000
Division Chromophyta				
Class Bacillariophyceae				
Order Biddulphiales				
Suborder Coscinodiscineae				
Family Thalassiosiraceae				
3. <i>Cyclotella striata</i>	1,058,000	921,000	178,000	395,000
4. <i>Lauderia annulata</i>	-	53,000	-	132,000
5. <i>Skeletonema</i> sp.	26,000	-	-	-

ตาราง ผลการวิเคราะห์แพลงก์ตอนพืช (เก็บตัวอย่างวันที่ 7 กันยายน 2566)

(ต่อ)

ชนิดแพลงก์ตอนพืช	ปริมาณแพลงก์ตอนพืช (หน่วยต่อลูกบาศก์เมตร)			
	2399371-1	2399371-2	2399371-3	2399371-4
6. <i>Stephanodiscus rotula</i>	-	736,000	203,000	316,000
7. <i>Thalassiosira eccentrica</i>	-	-	-	132,000
8. <i>Thalassiosira rotula</i>	-	-	813,000	-
Family Melosiraceae				
9. <i>Melosira dubia</i>	-	53,000	-	-
Family Coscinodiscaceae				
10. <i>Coscinodiscus concinnus</i>	117,438,000	118,876,000	171,704,000	128,061,000
11. <i>Coscinodiscus gigas</i>	26,000	-	25,000	26,000
12. <i>Coscinodiscus wailesii</i>	-	158,000	25,000	-
Family Asterolampraceae				
13. <i>Asteromphalus flabellatus</i>	-	-	25,000	53,000
Family Hemidiscaceae				
14. <i>Actinocyclus senarius</i>	-	26,000	-	79,000
Suborder Rhizosoleniineae				
Family Rhizosoleniaceae				
15. <i>Dactylosolen fragillissima</i>	-	-	51,000	-
16. <i>Guinardia delicatula</i>	-	-	76,000	-
17. <i>Guinardia flaccida</i>	53,000	263,000	152,000	26,000
18. <i>Guinardia striata</i>	-	-	127,000	-
19. <i>Proboscia alata</i>	212,000	316,000	152,000	184,000
20. <i>Pseudosolenia calcar-avis</i>	-	-	51,000	-
21. <i>Rhizosolenia acuminata</i>	-	79,000	152,000	-
22. <i>Rhizosolenia imbricata</i>	-	79,000	-	-
23. <i>Rhizosolenia robusta</i>	-	-	-	26,000
24. <i>Rhizosolenia setigera</i>	1,693,000	5,576,000	13,716,000	27,931,000
25. <i>Rhizosolenia striata</i>	79,000	-	25,000	26,000
26. <i>Rhizosolenia styliformis</i>	26,000	-	-	-

ตาราง ผลการวิเคราะห์แฟลกellate (เก็บตัวอย่างวันที่ 7 กันยายน 2566)

(ต่อ)

ชนิดแฟลกellate	ปริมาณแฟลกellate (หน่วยต่อลูกบาศก์เมตร)			
	2399371-1	2399371-2	2399371-3	2399371-4
Suborder Biddulphiineae				
Family Hemiaulaceae				
27. <i>Cerataulina bicornis</i>	26,000	-	-	-
28. <i>Cerataulina pelagica</i>	106,000	842,000	127,000	501,000
29. <i>Hemiaulus hauckii</i>	-	53,000	-	53,000
30. <i>Hemiaulus indicus</i>	-	-	51,000	-
Family Chaetoceraceae				
31. <i>Bacteriastrum delicatulum</i>	132,000	316,000	254,000	553,000
32. <i>Bacteriastrum furcatum</i>	291,000	210,000	25,000	105,000
33. <i>Bacteriastrum</i> sp.	238,000	526,000	51,000	474,000
34. <i>Chaetoceros curvisetus</i>	317,000	289,000	406,000	343,000
35. <i>Chaetoceros didymus</i>	-	79,000	25,000	-
36. <i>Chaetoceros diversus</i>	238,000	1,262,000	1,524,000	105,000
37. <i>Chaetoceros laciniosus</i>	-	53,000	102,000	184,000
38. <i>Chaetoceros lorenzianus</i>	-	26,000	254,000	422,000
39. <i>Chaetoceros mitra</i>	-	-	-	26,000
40. <i>Chaetoceros peruvianus</i>	-	-	51,000	26,000
41. <i>Chaetoceros pseudocurvisetus</i>	132,000	447,000	102,000	105,000
42. <i>Chaetoceros</i> sp.	-	421,000	610,000	105,000
43. <i>Chaetoceros teres</i>	-	53,000	25,000	79,000
Family Eupodiscaceae				
44. <i>Odontella mobiliensis</i>	-	26,000	-	-
45. <i>Odontella sinensis</i>	26,000	-	-	-
Order Bacillariales				
Suborder Fragilariineae				
Family Thalassionemataceae				
46. <i>Thalassionema frauenfeldii</i>	-	-	457,000	105,000

ตาราง ผลการวิเคราะห์แฟลกellate (เก็บตัวอย่างวันที่ 7 กันยายน 2566)

(ต่อ)

ชนิดแฟลกellate	ปริมาณแฟลกellate (หน่วยต่อลูกบาศก์เมตร)			
	2399371-1	2399371-2	2399371-3	2399371-4
47. <i>Thalassionema nitzschioides</i>	1,058,000	1,052,000	1,270,000	1,581,000
Family Licmophoriaceae				
48. <i>Licmophora abbreviata</i>	-	-	-	26,000
Suborder Bacillariineae				
Family Naviculaceae				
49. <i>Amphora robusta</i>	-	-	-	79,000
50. <i>Diploneis smithii</i>	26,000	-	-	-
51. <i>Haslea tromphii</i>	-	-	-	26,000
52. <i>Luticola mutica</i>	159,000	184,000	76,000	105,000
53. <i>Meynier membranacea</i>	-	-	76,000	298,000
54. <i>Navicula cuspidata</i>	79,000	-	-	26,000
55. <i>Navicula lanceolata</i>	-	-	25,000	-
56. <i>Navicula</i> sp.	-	105,000	-	-
57. <i>Pinnularia viridis</i>	26,000	-	-	-
58. <i>Pleurosigma aestuarii</i>	-	132,000	25,000	53,000
59. <i>Pleurosigma angulatum</i>	238,000	132,000	127,000	474,000
60. <i>Pleurosigma balticum</i>	-	-	-	26,000
61. <i>Pleurosigma directum</i>	-	-	-	53,000
62. <i>Pleurosigma elongatum</i>	-	237,000	-	132,000
63. <i>Pleurosigma normanii</i>	132,000	26,000	-	211,000
64. <i>Pleurosigma</i> sp.	106,000	-	-	-
Family Bacillariaceae				
65. <i>Bacillaria paxillifer</i>	53,000	-	-	-
66. <i>Cylindrotheca closterium</i>	132,000	79,000	508,000	79,000
67. <i>Nitzschia acicularis</i>	-	-	-	53,000
68. <i>Nitzschia lorenziana</i>	423,000	105,000	127,000	79,000
69. <i>Nitzschia sigma</i>	53,000	-	127,000	26,000
70. <i>Nitzschia sigmoidea</i>	26,000	-	51,000	105,000

ตาราง ผลการวิเคราะห์แพลงก์ตอนพืช (เก็บตัวอย่างวันที่ 7 กันยายน 2566)

(ต่อ)

ชนิดแพลงก์ตอนพืช	ปริมาณแพลงก์ตอนพืช (หน่วยต่อลูกบาศก์เมตร)			
	2399371-1	2399371-2	2399371-3	2399371-4
71. <i>Nitzschia</i> sp.	-	-	-	527,000
72. <i>Pseudo-nitzschia</i> sp.	-	316,000	-	-
73. <i>Tryblionella hungarica</i>	-	26,000	25,000	53,000
Family Surirellaceae				
74. <i>Surirella ovata</i>	185,000	53,000	25,000	79,000
75. <i>Surirella robusta</i>	53,000	-	-	53,000
Class Dictyochophyceae				
Order Dictyochales				
Family Dictyochophyceae				
76. <i>Dictyocha fibula</i>	-	-	51,000	26,000
Class Dinophyceae				
Order Prorocentrales				
Family Prorocentraceae				
77. <i>Prorocentrum micans</i>	53,000	210,000	51,000	-
78. <i>Prorocentrum sigmoides</i>	26,000	-	-	-
Order Dinophysiales				
Family Dinophysaceae				
79. <i>Dinophysis caudata</i>	-	26,000	51,000	-
Order Gymnodiniales				
Family Gymnodiniaceae				
80. <i>Gymnodinium</i> sp.	-	-	-	53,000
Order Gonyaulacales				
Family Ceratiaceae				
81. <i>Ceratium deflexum</i>	-	26,000	-	-
82. <i>Ceratium furca</i>	132,000	158,000	2,540,000	26,000
83. <i>Ceratium fuscus</i>	106,000	158,000	381,000	-
84. <i>Ceratium macroceros</i>	26,000	-	-	-

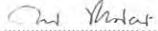
ตาราง ผลการวิเคราะห์แพลงก์ตอนพืช (เก็บตัวอย่างวันที่ 7 กันยายน 2566)

(ต่อ)

ชนิดแพลงก์ตอนพืช	ปริมาณแพลงก์ตอนพืช (หน่วยต่อลูกบาศก์เมตร)			
	2399371-1	2399371-2	2399371-3	2399371-4
85. <i>Ceratium vulturn</i>	-	-	25,000	-
Family Gonyaulacaceae				
86. <i>Gonyaulax spinifera</i>	-	-	203,000	26,000
Order Peridiniales				
Family Protoperidiniaceae				
87. <i>Protoperidinium abei</i>	26,000	-	-	-
88. <i>Protoperidinium curtipes</i>	26,000	-	51,000	-
89. <i>Protoperidinium leonis</i>	53,000	132,000	-	-
90. <i>Protoperidinium</i> sp.	212,000	-	127,000	-
ชนิดแพลงก์ตอนพืช	43	45	52	56
ปริมาณแพลงก์ตอนพืช	125,552,000	134,949,000	197,481,000	165,270,000
ดัชนีความหลากหลายแพลงก์ตอนพืช	0.4304	0.6914	0.6618	0.8493
ดัชนีความสม่ำเสมอแพลงก์ตอนพืช	0.1144	0.1816	0.1675	0.2110

Sample Location : 1. สถานี 2399371-1 : สถานีที่ 1 บริเวณพื้นที่วางท่อน้ำมัน ด้านใกล้แนววางท่อน้ำมัน
 2. สถานี 2399371-2 : สถานีที่ 2 บริเวณที่มีการเพาะเลี้ยงสัตว์น้ำในกระชัง ด้านชุมชนบ้านเล
 3. สถานี 2399371-3 : สถานีที่ 3 บริเวณแหล่งน้ำธรรมชาติ ด้านสะพานรับ-ส่งน้ำมันของ ปตท.
 4. สถานี 2399371-4 : สถานีที่ 4 บริเวณที่มีการเพาะเลี้ยงสัตว์น้ำ ด้านชุมชนฝั่งคลองน้ำมัน ปตท.

Condition of Sample : contained in one plastic bottle, sample containers comply to pretreatment- preservation standards (APHA, USEPA)


 (นางสาวกนกวรรณ ขวค่อน)
 ผู้วิเคราะห์


 (นายอลงกต อินทรชาติ)
 หัวหน้าสถานีวิจัยประมงศรีราชา



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

Client : PTTEP International Limited

Address : 222 Moo 1 Tambon Huakao, Amphur Singhanakorn, Songkhla, Thailand, 90280

Project Name : PSB Songkhla

รายงานผลการวิเคราะห์แพลงก์ตอนพืช

ตาราง ผลการวิเคราะห์แพลงก์ตอนพืช (เก็บตัวอย่างวันที่ 6 ธันวาคม 2566)

ชนิดแพลงก์ตอนพืช	ปริมาณแพลงก์ตอนพืช (หน่วยต่อลูกบาศก์เมตร)			
	23131384-1	23131384-2	23131384-3	23131384-4
Division Cyanophyta				
Class Cyanophyceae				
Order Nostocales				
Family Oscillatoriaceae				
1. <i>Oscillatoria prolifica</i>	-	5,000	-	-
2. <i>Oscillatoria</i> sp.	17,000	32,000	44,000	71,000
Family Nostocaceae				
3. <i>Pseudanabaena</i> sp.	6,000	-	-	-
Division Chlorophyta				
Class Chlorophyceae				
Order Chlorococcales				
Family Coelastraceae				
4. <i>Coelastrum microporum</i>	-	-	6,000	-

ตาราง ผลการวิเคราะห์แพลงก์ตอนพืช (เก็บตัวอย่างวันที่ 6 ธันวาคม 2566)

(ต่อ)

ชนิดแพลงก์ตอนพืช	ปริมาณแพลงก์ตอนพืช (หน่วยต่อลูกบาศก์เมตร)			
	23131384-1	23131384-2	23131384-3	23131384-4
Family Oocystaceae				
5. <i>Ankistrodesmus falcatus</i>	-	5,000	-	-
6. <i>Chlorella</i> sp.	-	27,000	-	-
7. <i>Dictyosphaerium pulchellum</i>	-	-	6,000	-
Family Scenedesmeceae				
8. <i>Crucigenia apiculata</i>	17,000	27,000	-	-
Order Zygomatales				
Family Zygnemataceae				
9. <i>Spirogyra</i> sp.	-	49,000	-	-
Family Desmidiaceae				
10. <i>Closterium ralfsii</i>	-	5,000	-	-
11. <i>Staurastrum</i> sp.	-	5,000	6,000	-
Class Euglenophyceae				
Order Euglenales				
Family Euglenaceae				
12. <i>Trachelomonas hispida</i>	-	5,000	19,000	-
Division Chromophyta				
Class Bacillariophyceae				
Order Biddulphiales				
Suborder Coscinodiscineae				
Family Thalassiosiraceae				
13. <i>Cyclotella meneghiniana</i>	-	5,000	-	-
14. <i>Cyclotella striata</i>	12,000	11,000	13,000	-
15. <i>Stephanodiscus</i> sp.	-	16,000	-	5,000
Family Melosiraceae				
16. <i>Paralia sulcata</i>	17,000	-	-	-

ตาราง ผลการวิเคราะห์แพลงก์ตอนพืช (เก็บตัวอย่างวันที่ 6 ธันวาคม 2566)
(ต่อ)

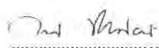
ชนิดแพลงก์ตอนพืช	ปริมาณแพลงก์ตอนพืช (หน่วยต่อลูกบาศก์เมตร)			
	23131384-1	23131384-2	23131384-3	23131384-4
Family Aulacoseiraceae				
17. <i>Aulacoseira granulata</i>	29,000	22,000	19,000	36,000
Family Coscinodiscaceae				
18. <i>Coscinodiscus granii</i>	-	-	-	10,000
Suborder Rhizosoleniineae				
Family Rhizosoleniaceae				
19. <i>Dactylosolen fragillissima</i>	12,000	-	-	-
20. <i>Proboscia alata</i>	6,000	-	-	-
21. <i>Rhizosolenia setigera</i>	-	5,000	-	-
Suborder Biddulphiineae				
Family Hemiaulaceae				
22. <i>Bacteriastrium furcatum</i>	-	-	13,000	-
23. <i>Chaetoceros curvisetus</i>	-	-	-	15,000
24. <i>Chaetoceros laciniosus</i>	6,000	-	-	-
25. <i>Chaetoceros lorenzianus</i>	-	11,000	-	-
26. <i>Chaetoceros socialis</i>	23,000	27,000	19,000	-
Family Lithodesmaceae				
27. <i>Bellerochea horologicalis</i>	-	5,000	-	-
Order Bacillariales				
Suborder Fragilariineae				
Family Fragilariaceae				
28. <i>Fragilaria capucina</i>	-	5,000	-	-
29. <i>Synedra ulna</i>	6,000	5,000	-	-
Suborder Bacillariineae				
Family Eunotiaceae				
30. <i>Eunotia flexuosa</i>	12,000	-	-	-

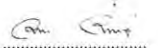
ตาราง ผลการวิเคราะห์แพลงก์ตอนพืช (เก็บตัวอย่างวันที่ 6 ธันวาคม 2566)
(ต่อ)

ชนิดแพลงก์ตอนพืช	ปริมาณแพลงก์ตอนพืช (หน่วยต่อลูกบาศก์เมตร)			
	23131384-1	23131384-2	23131384-3	23131384-4
Family Naviculaceae				
31. <i>Pinnularia gibba</i>	-	5,000	-	-
32. <i>Pleurosigma angulatum</i>	-	-	-	5,000
33. <i>Pleurosigma balticum</i>	23,000	27,000	-	41,000
34. <i>Pleurosigma elongatum</i>	6,000	-	-	10,000
Family Bacillariaceae				
35. <i>Nitzschia acicularis</i>	6,000	-	-	5,000
36. <i>Nitzschia lorenziana</i>	6,000	-	6,000	-
37. <i>Nitzschia sigmaidea</i>	-	-	-	5,000
Class Dinophyceae				
Order Peridinales				
Family Peridiniaceae				
38. <i>Protoperdinium thorianum</i>	-	-	6,000	-
ชนิดแพลงก์ตอนพืช	16	21	11	10
ปริมาณแพลงก์ตอนพืช	204,000	304,000	157,000	203,000
ดัชนีความหลากหลายแพลงก์ตอนพืช	2.6167	2.7197	2.1596	1.8513
ดัชนีความสม่ำเสมอแพลงก์ตอนพืช	0.9438	0.8933	0.9006	0.8040

Sample Location : 1. สถานี 23131384-1 : สถานีที่ 1 บริเวณพื้นที่วางท่อน้ำมัน ด้านใกล้แนววาง
ท่อน้ำมัน
2. สถานี 23131384-2 : สถานีที่ 2 บริเวณที่มีการเพาะเลี้ยงสัตว์น้ำในกระชัง
ด้านชุมชนบ้านเล
3. สถานี 23131384-3 : สถานีที่ 3 บริเวณแหล่งน้ำธรรมชาติ ด้านสะพานรับ-
ส่งน้ำมันของ ปตท.
4. สถานี 23131384-4 : บริเวณที่มีการเพาะเลี้ยงสัตว์น้ำ ด้านชุมชนฝั่งกลิ้ง
น้ำมัน ปตท.

Condition of Sample : contained in one plastic bottle, sample containers comply to pretreatment-preservation standards (APHA, USEPA)


.....
(นางสาวกนกวรรณ ขวาค่อน)
ผู้วิเคราะห์


.....
(นายอองกิต อินทรชาติ)
หัวหน้าสถานีวิจัยประมงศรีราชา



สถานีวิจัยประมงศรีราชา

101/12 หมู่ 9 ต. บางพระ

อ. ศรีราชา จ. ชลบุรี 20110

โทร./โทรสาร. (038) 311379

Client : PTTEP International Limited

Address : 222 Moo 1 Tambon Huakao, Amphur Singhanakorn, Songkhla, Thailand, 9028

Project Name : PSB Songkhla

รายงานผลการวิเคราะห์แพลงก์ตอนสัตว์

ตาราง ผลการวิเคราะห์แพลงก์ตอนสัตว์ (เก็บตัวอย่างวันที่ 7 กันยายน 2566)

ชนิดแพลงก์ตอนสัตว์	ปริมาณแพลงก์ตอนสัตว์ (หน่วยต่อลูกบาศก์เมตร)			
	2399371-1	2399371-2	2399371-3	2399371-4
Phylum Protozoa				
Subphylum Ciliophora				
Class Ciliata				
Subclass Spirotricha				
Order Tintinnida				
Family Tintinnididae				
1. <i>Leprotintinnus nordquisti</i>	132,000	132,000	203,000	105,000
Family Codonellidae				
2. <i>Tintinnopsis cylindrica</i>	-	26,000	102,000	-
3. <i>Tintinnopsis fimbriata</i>	-	-	-	26,000
4. <i>Tintinnopsis gracilis</i>	-	-	25,000	-
5. <i>Tintinnopsis ovienlalis</i>	-	-	-	26,000
6. <i>Tintinnopsis subacuta</i>	-	26,000	-	-
7. <i>Tintinnopsis tocaninensis</i>	53,000	53,000	76,000	53,000

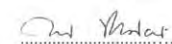
ตาราง ผลการวิเคราะห์แพลงก์ตอนสัตว์ (เก็บตัวอย่างวันที่ 7 กันยายน 2566)

(ต่อ)

ชนิดแพลงก์ตอนสัตว์	ปริมาณแพลงก์ตอนสัตว์ (หน่วยต่อลูกบาศก์เมตร)			
	2399371-1	2399371-2	2399371-3	2399371-4
Family Codonellopsidae				
8. <i>Codonellopsis ostenfeldi</i>	-	53,000	-	-
9. <i>Stenosemella nivalis</i>	-	26,000	-	-
Family Tintinnidae				
10. <i>Amphorella infundibulum</i>	26,000	-	25,000	-
Phylum Arthropoda				
Class Crustacea				
Subclass Copepoda				
11. Copepod nauplii	53,000	53,000	76,000	79,000
Order Cyclopoida				
12. Cyclopoid copepod	26,000	-	-	-
Subclass Cirripedia				
13. Cirripede nauplii	-	-	-	26,000
Phylum Mollusca				
Class Bivalvia				
14. Pelecypod larvae	-	-	-	26,000
ชนิดแพลงก์ตอนสัตว์	5	7	6	7
ปริมาณแพลงก์ตอนสัตว์	290,000	369,000	507,000	341,000
ดัชนีความหลากหลายแพลงก์ตอนสัตว์	1.4119	1.7646	1.5549	1.7758
ดัชนีความสม่ำเสมอแพลงก์ตอนสัตว์	0.8773	0.9068	0.8678	0.9126

Sample Location : 1. สถานี 2399371-1 : สถานีที่ 1 บริเวณพื้นที่วางท่อน้ำมัน ด้านใกล้แนววางท่อน้ำมัน
 2. สถานี 2399371-2 : สถานีที่ 2 บริเวณที่มีการเพาะเลี้ยงสัตว์น้ำในกระชัง ด้านชุมชนบ้านเล
 3. สถานี 2399371-3 : สถานีที่ 3 บริเวณแหล่งน้ำธรรมชาติ ด้านสะพานรับ-ส่งน้ำมันของ ปตท.
 4. สถานี 2399371-4 : สถานีที่ 4 บริเวณที่มีการเพาะเลี้ยงสัตว์น้ำ ด้านชุมชนฝั่งคลังน้ำมัน ปตท.

Condition of Sample : contained in one plastic bottle, sample containers comply to pretreatment- preservation standards (APHA, USEPA)



(นางสาวกนกวรรณ ขาวดอน)

ผู้วิเคราะห์



(นายอลงกต อินทรชาติ)

หัวหน้าสถานีวิจัยประมงศรีราชา



สถานีวิทยุประมงศรีราชา

101/12 หมู่ 9 ต. บางพระ

อ. ศรีราชา จ. ชลบุรี 20110

โทร./โทรสาร. (038) 311379

Client : PTTEP International Limited

Address : 222 Moo 1 Tambon Huakao, Amphur Singhanakorn, Songkhla, Thailand, 90280

Project Name : PSB Songkhla

รายงานผลการวิเคราะห์แหล่งกักต่อนสัตว์

ตาราง ผลการวิเคราะห์แหล่งกักต่อนสัตว์ (เก็บตัวอย่างวันที่ 6 ธันวาคม 2566)

ชนิดแหล่งกักต่อนสัตว์	ปริมาณแหล่งกักต่อนสัตว์ (หน่วยต่อลูกบาศก์เมตร)			
	23131384-1	23131384-2	23131384-3	23131384-4
Phylum Protozoa				
Subphylum Plasmodroma				
Class Sarcodina				
Subclass Rhizopoda				
Order Testacida				
Family Arcellidae				
1. <i>Arcella vulgaris</i>	6,000	-	-	-
Order Foraminiferida				
2. <i>Globorotalia</i> sp.	6,000	-	-	-
Subphylum Ciliophora				
Class Ciliata				
Subclass Spirotricha				
Order Tintinnida				
Family Codonellidae				
3. <i>Tintinnopsis fimbriata</i>	12,000	-	6,000	10,000

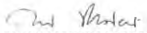
ตาราง ผลการวิเคราะห์แหล่งกักต่อนสัตว์ (เก็บตัวอย่างวันที่ 6 ธันวาคม 2566)

(ต่อ)

ชนิดแหล่งกักต่อนสัตว์	ปริมาณแหล่งกักต่อนสัตว์ (หน่วยต่อลูกบาศก์เมตร)			
	23131384-1	23131384-2	23131384-3	23131384-4
4. <i>Tintinnopsis</i> sp.	6,000	-	-	-
Order Hypotrichida				
5. <i>Enplotes</i> sp.	17,000	-	-	-
Phylum Rotifera				
Class Monogononta				
Order Ploima				
Family Brachionidae				
6. <i>Brachionus calyciflorus</i>	-	5,000	-	-
7. <i>Brachionus plicatilis</i>	6,000	5,000	6,000	10,000
Phylum Arthropoda				
Class Crustacea				
Subclass Branchiopoda				
Order Diplostraca				
Suborder Cladocera				
8. Water fleas nauplius	17,000	11,000	13,000	15,000
Family Moinidae				
9. <i>Moina macrocopa</i>	6,000	16,000	31,000	61,000
Subclass Copepoda				
10. Copepod nauplius	23,000	22,000	13,000	5,000
Order Calanoida				
11. Calanoid copepod	12,000	5,000	6,000	10,000
ชนิดแหล่งกักต่อนสัตว์	10	6	6	6
ปริมาณแหล่งกักต่อนสัตว์	111,000	64,000	75,000	111,000
ดัชนีความหลากหลายแหล่งกักต่อนสัตว์	2.1705	1.6138	1.5789	1.3896
ดัชนีความสม่ำเสมอแหล่งกักต่อนสัตว์	0.9426	0.9007	0.8812	0.7756

- Sample Location :
1. สถานี 23131384-1 : สถานีที่ 1 บริเวณพื้นที่วางท่อน้ำมัน ด้านใกล้แนวราง ท่อน้ำมัน
 2. สถานี 23131384-2 : สถานีที่ 2 บริเวณที่มีการเพาะเลี้ยงสัตว์น้ำในกระชัง ด้านชุมชนบ้านเล
 3. สถานี 23131384-3 : สถานีที่ 3 บริเวณแหล่งน้ำธรรมชาติ ด้านสะพานรับ-ส่งน้ำมันของ ปตท.
 4. สถานี 23131384-4 : บริเวณที่มีการเพาะเลี้ยงสัตว์น้ำ ด้านชุมชนฝั่งคลองน้ำมัน ปตท.

Condition of Sample : contained in one plastic bottle, sample containers comply to pretreatment-preservation standards (APHA, USEPA)


(นางสาวกนกวรรณ ขวาค้อน)
ผู้วิเคราะห์


(นายอภิลกษ อินทรชาติ)
หัวหน้าสถานีวิจัยประมงศรีราชา



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

Client : PTTEP International Limited

Address : 222 Moo 1 Tambon Huakao, Amphur Singhanakorn, Songkhla, Thailand, 90280

Project Name : PSB Songkhla

รายงานผลการวิเคราะห์สัตว์หน้าดิน

ตาราง ผลการวิเคราะห์สัตว์หน้าดิน (เก็บตัวอย่างวันที่ 7 กันยายน 2566)

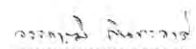
สกุลสัตว์หน้าดิน	ปริมาณสัตว์หน้าดิน (ตัวต่อตารางเมตร)			
	2399374-1	2399374-2	2399374-3	2399374-4
Phylum Mollusca				
Class Gastropoda				
Order Caenogastropoda				
Family Cerithiidae				
Rhinoclavis sp. (หอยขี้เหล็ก)	-	-	-	119
Family Potamididae				
Cerithidea sp. (หอยจืด)	-	-	-	15
สกุลสัตว์หน้าดิน	-	-	-	2
ปริมาณสัตว์หน้าดิน	-	-	-	134
ค่าดัชนีความหลากหลายสัตว์หน้าดิน	-	-	-	0.3506

- Sample Location :
1. สถานี 2399374-1 : สถานีที่ 1 บริเวณพื้นที่วางท่อน้ำมัน ด้านใกล้แนวรางท่อน้ำมัน
 2. สถานี 2399374-2 : สถานีที่ 2 บริเวณที่มีการเพาะเลี้ยงสัตว์น้ำในกระชัง ด้านชุมชนบ้านเล

3. สถานี 2399374-3 : สถานีที่ 3 บริเวณแหล่งน้ำธรรมชาติ ด้านสะพานรับ-ส่งน้ำมันของ
ปตท.

4. สถานี 2399374-4 : สถานีที่ 4 บริเวณที่มีการเพาะเลี้ยงสัตว์น้ำ ด้านชุมชนฝั่งคลองน้ำมัน
ปตท.

Condition of Sample : contained in one plastic zip bag



(นายอรรถวุฒิ กันทะวงศ์)

ผู้วิเคราะห์



(นายอรรถวุฒิ กันทะวงศ์)

หัวหน้าสถานีวิจัยประมงศรีราชา



สถานีวิจัยประมงศรีราชา

101/12 หมู่ 9 ต. บางพระ

อ. ศรีราชา จ. ชลบุรี 20110

โทร./โทรสาร. (038) 311379

Client : PTTEP International Limited

Address : 222 Moo 1 Tambon Huakao, Amphur Singhanakorn, Songkhla, Thailand, 90280

Project Name : PSB Songkhla

รายงานผลการวิเคราะห์สัตว์หน้าดิน

ตาราง ผลการวิเคราะห์สัตว์หน้าดิน (เก็บตัวอย่างวันที่ 6 ธันวาคม 2566)

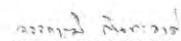
สกุลสัตว์หน้าดิน	ปริมาณสัตว์หน้าดิน (ตัวต่อตารางเมตร)			
	23131385-1	23131385-2	23131385-3	23131385-4
Phylum Annelida				
Class Polychaeta				
Order Phyllodocida				
Family Nephtyidae				
Nephtys sp. (ไส้เดือนทะเล)	15	-	-	-
Phylum Arthropoda				
Class Malacostraca				
Order Amphipoda				
Family Ampeliscaidae				
Ampelisca sp. (แอมพีพอด)	-	-	-	15
Order Decapoda				
Family Diogenidae				
Diogenes sp. (ปูเสฉวน)	-	-	-	15

ตาราง ผลการวิเคราะห์สัตว์หน้าดิน (เก็บตัวอย่างวันที่ 6 ธันวาคม 2566) (ต่อ)

สกุลสัตว์หน้าดิน	ปริมาณสัตว์หน้าดิน (ตัวต่อตารางเมตร)			
	23131385-1	23131385-2	23131385-3	23131385-4
Phylum Mollusca				
Class Gastropoda				
Order Caenogastropoda				
Family Potamididae				
<i>Cerithidea</i> sp. (หอยจู้บแข็ง)	-	-	45	60
สกุลสัตว์หน้าดิน	1	-	1	3
ปริมาณสัตว์หน้าดิน	15	-	45	90
ค่าดัชนีความหลากหลายสัตว์หน้าดิน	0.0000	-	0.0000	0.8676

Sample Location : 1. สถานี 23131385-1 : สถานีที่ 1 บริเวณพื้นที่วางท่อน้ำมัน ด้านใกล้แนววางท่อน้ำมัน
 2. สถานี 23131385-2 : สถานีที่ 2 บริเวณที่มีการเพาะเลี้ยงสัตว์น้ำในกระชัง ด้านชุมชนบ้านเล
 3. สถานี 23131385-3 : สถานีที่ 3 บริเวณแหล่งน้ำธรรมชาติ ด้านสะพานรับ-ส่งน้ำมันของปตท.
 4. สถานี 23131385-4 : สถานีที่ 4 บริเวณที่มีการเพาะเลี้ยงสัตว์น้ำ ด้านชุมชนฝั่งคลังน้ำมันปตท.

Condition of Sample : contained in one plastic zip bag



(นายอรธวุฒิ กันทะวงศ์)

ผู้วิเคราะห์



(นายอลงกต อินทรชาติ)

หัวหน้าสถานีวิจัยประมงศรีราชา

คุณภาพน้ำทิ้ง



Analysis / Test Report

Client : PTTEP International Limited
222 Moo 1, Tambon Huakao, Amphur Singhanakorn, Songkhla Thailand 90280
P/O : 3450040615
Project Name : PSB Songkhla
Project Location :



TESTING
No.0166

Lot ID: 2373472
Date Received : Jul 14, 2023
Date Reported : Jul 21, 2023
Report Number : 2695652-1

Page 1 of 1

Sample Number 2373472-2
Sampled Date Jul 14, 2023 9:22 AM
Sample Description Wastewater
Location ปล่อยน้ำทิ้งบริเวณท่าเรือ 2 (Manhole 2)
Date Analysis Commenced Jul 15, 2023
Condition of Sample Contained in one amber glass bottle and three plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
BOD (5 days at 20 degree C)	mg/L	-	2.0	<2.0	≤20	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5210 B, part 4500 - O G	Songkhla
COD	mg/L	-	25	42	≤120	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5220 D	Songkhla
Oil & Grease *	mg/L	-	3	<3	≤5	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5520 B	Songkhla
pH at 25 degree C *	-	-	-	8.1	5.5-9.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500 - H (B)	Songkhla
Total Dissolved solids Dried at 180 degree C	mg/L	-	5	108	≤3000	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 C	Songkhla
Total Suspended Solids	mg/L	-	5	6	≤50	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 D	Songkhla

Guideline : Effluent standard for factories, industrial estate and industrial park set by Notification of the Ministry of Natural Resource and Environment and effluent standard for factories and industrial park set by Notification of The Ministry of Industry dated June 07, B.E.2560 (2017).

Remark :

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Technical Management

Ananta B.

Ananta Boonphet
Scientist (2)

ทะเบียนเลขที่ ว-267-จ-0004

Approved by

Kanitta H.

Kanitta Hemprasatporn
Section Head

ทะเบียนเลขที่ ว-267-จ-7296

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Analysis / Test Report

Client : PTTEP International Limited
222 Moo 1, Tambon Huakao, Amphur Singhanakorn, Songkhla Thailand 90280
P/O : 3450040615
Project Name : PSB Songkhla
Project Location :



TESTING
No.0166

Lot ID: 2373466
Date Received : Jul 14, 2023
Date Reported : Jul 21, 2023
Report Number : 2695608-1

Page 1 of 2

Sample Number 2373466-1
Sampled Date Jul 14, 2023 10:48 AM
Sample Description Wastewater
Location บริเวณอาคารนิคมฯ
Date Analysis Commenced Jul 15, 2023
Condition of Sample Contained in one amber glass bottle and three plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
BOD *	mg/L	-	2	27.0	≤40	Based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5210 B	Songkhla
COD	mg/L	-	25	121	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5220 D	Songkhla
Oil & Grease	mg/L	-	3	3	≤20	In-house method : STM 13-006 based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500 - H (B)	Songkhla
pH at 25 degree C	-	-	-	7.9	5.0-9.0	In-house method : STM 13-001 based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500 - H (B)	Songkhla
Total Dissolved Solids Dried at 103-105 degree C *	mg/L	-	5	340	(1)	In-house method : STM 04-010 based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 C	Songkhla
Total Suspended Solids	mg/L	-	5	24	≤50	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 D	Songkhla

Guideline : Notification of Ministry of Natural Resources and Environment November, 7, B.E. 2548 on Effluent Control Standard from Types and Sized of Buildings, Type C.

(1) : The values are in addition to the Total Dissolved Solids of the water used not more than 500 mg/L.

Sampling By : Somsak Junkong , Woravut Deenuk

Remark :

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Analysis / Test Report

Client : PTTEP International Limited
222 Moo 1, Tambon Huakao, Amphur Singhanakorn, Songkhla Thailand 90280
P/O : 3450040615
Project Name : PSB Songkhla
Project Location :



TESTING
No.0166

Lot ID: 2373466
Date Received : Jul 14, 2023
Date Reported : Jul 21, 2023
Report Number : 2695608-1

Page 2 of 2

Sample Number 2373466-2
Sampled Date Jul 14, 2023 10:43 AM
Sample Description Wastewater
Location จดหมายแจ้งจากอาคารปฏิบัติการและโรงงาน
Date Analysis Commenced Jul 15, 2023
Condition of Sample Contained in one amber glass bottle and three plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
BOD *	mg/L	-	2	7.4	≤40	Based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5210 B	Songkhla
COD	mg/L	-	25	82	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5220 D	Songkhla
Oil & Grease	mg/L	-	3	<3	≤20	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5520 B	Songkhla
pH at 25 degree C	-	-	-	7.8	5.0-9.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500 - H (B)	Songkhla
Total Dissolved Solids Dried at 103-105 degree C *	mg/L	-	5	332	(1)	In-house method : STM 04-010 based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 C	Songkhla
Total Suspended Solids	mg/L	-	5	14	≤50	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 D	Songkhla

Guideline : Notification of Ministry of Natural Resources and Environment November, 7, B.E. 2548 on Effluent Control Standard from Types and Sized of Buildings, Type C.

(1) : The values are in addition to the Total Dissolved Solids of the water used not more than 500 mg/L.

Sampling By : Somsak Junkong , Woravut Deenuk

Remark :

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Approved by

Ananta B.

Ananta Boonphet
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Analysis / Test Report

Client : PTTEP International Limited
222 Moo 1, Tambon Huakao, Amphur Singhanakorn, Songkhla Thailand 90280
P/O : 3450040615
Project Name : PSB Songkhla
Project Location :



TESTING
No.0166

Lot ID: 2373467
Date Received : Jul 14, 2023
Date Reported : Jul 21, 2023
Report Number : 2695612-1

Page 1 of 1

Sample Number 2373467-1
Sampled Date Jul 14, 2023 9:50 AM
Sample Description Wastewater
Location Chemical transit area
Date Analysis Commenced Jul 15, 2023
Condition of Sample Contained in one amber glass bottle and three plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
BOD (5 days at 20 degree C)	mg/L	-	2.0	<2.0	≤20	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5210 B, part 4500 - O G	Songkhla
COD	mg/L	-	25	<25	≤120	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5220 D	Songkhla
Oil & Grease *	mg/L	-	3	<3	≤5	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5520 B	Songkhla
pH at 25 degree C *	-	-	-	7.7	5.5-9.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500 - H (B)	Songkhla
Total Dissolved solids Dried at 180 degree C	mg/L	-	5	76	≤3000	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 C	Songkhla
Total Suspended Solids	mg/L	-	5	9	≤50	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 D	Songkhla

Guideline : Effluent standard for factories, industrial estate and industrial park set by Notification of the Ministry of Natural Resource and Environment and effluent standard for factories and industrial park set by Notification of The Ministry of Industry dated June 07, B.E.2560 (2017).

Sampling By : Somsak Junkong ทะเบียนเลขที่ 2-267-2-8341 , Woravut Deenuk ทะเบียนเลขที่ 2-204-2-8608

Remark :

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Technical Management

Ananta B.

Ananta Boonphet
Scientist (2)

ทะเบียนเลขที่ 2-267-2-0004

Approved by

Kanitta H.

Kanitta Hemprasatporn
Section Head

ทะเบียนเลขที่ 2-267-2-7296

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Analysis / Test Report

Client : PTTEP International Limited

222 Moo 1, Tambon Huakao, Amphur Singhanakorn, Songkhla Thailand 90280

P/O : 3450040615

Project Name : PSB Songkhla

Project Location :



TESTING
No.0166

Lot ID: 2384343

Date Received : Aug 02, 2023

Date Reported : Aug 09, 2023

Report Number : 2722616-1

Page 1 of 3

Sample Number	2384343-1
Sampled Date	Aug 02, 2023 9:58 AM
Sample Description	Wastewater
Location	บ่อกักน้ำทิ้งบริเวณท่าเทียบเรือ 1 (Manhole 1)
Date Analysis Commenced	Aug 02, 2023
Condition of Sample	Contained in one amber glass bottle and three plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
BOD (5 days at 20 degree C)	mg/L	-	2.0	<2.0	≤20	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5210 B, part 4500 - O G	Songkhla
COD	mg/L	-	25	<25	≤120	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5220 D	Songkhla
Oil & Grease *	mg/L	-	3	<3	≤5	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5520 B	Songkhla
pH at 25 degree C *	-	-	-	7.5	5.5-9.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500 - H (B)	Songkhla
Total Dissolved solids Dried at 180 degree C	mg/L	-	5	100	≤3000	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 C	Songkhla
Total Suspended Solids	mg/L	-	5	12	≤50	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 D	Songkhla

Guideline : Effluent standard for factories, industrial estate and industrial park set by Notification of the Ministry of Natural Resource and Environment and effluent standard for factories and industrial park set by Notification of The Ministry of Industry dated June 07, B.E.2560 (2017).

Sampling By : Sirichai Kleangkerng ๖-๒๖๗-๖-๗๖๒๓, Woravut Deenuk ๖-๒๐๔-๖-๘๖๐๘

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Technical Management

Ananta B.

Ananta Boonphet
Scientist (2)

ทะเบียนเลขที่ ๖-๒๖๗-๖-๐๐๐๔

Approved by

Kanitta H.

Kanitta Hemprasatporn
Section Head

ทะเบียนเลขที่ ๖-๒๖๗-๖-๗๒๙๖

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Analysis / Test Report

Client : PTTEP International Limited

222 Moo 1, Tambon Huakao, Amphur Singhanakorn, Songkhla Thailand 90280

P/O : 3450040615

Project Name : PSB Songkhla

Project Location :



TESTING
No.0166

Lot ID: 2384343

Date Received : Aug 02, 2023

Date Reported : Aug 09, 2023

Report Number : 2722616-1

Page 2 of 3

Sample Number	2384343-2
Sampled Date	Aug 02, 2023 9:52 AM
Sample Description	Wastewater
Location	บ่อกักน้ำทิ้งบริเวณท่าเทียบเรือ 2 (Manhole 2)
Date Analysis Commenced	Aug 02, 2023
Condition of Sample	Contained in one amber glass bottle and three plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
BOD (5 days at 20 degree C)	mg/L	-	2.0	<2.0	≤20	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5210 B, part 4500 - O G	Songkhla
COD	mg/L	-	25	<25	≤120	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5220 D	Songkhla
Oil & Grease *	mg/L	-	3	<3	≤5	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5520 B	Songkhla
pH at 25 degree C *	-	-	-	7.7	5.5-9.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500 - H (B)	Songkhla
Total Dissolved solids Dried at 180 degree C	mg/L	-	5	64	≤3000	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 C	Songkhla
Total Suspended Solids	mg/L	-	5	<5	≤50	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 D	Songkhla

Guideline : Effluent standard for factories, industrial estate and industrial park set by Notification of the Ministry of Natural Resource and Environment and effluent standard for factories and industrial park set by Notification of The Ministry of Industry dated June 07, B.E.2560 (2017).

Sampling By : Sirichai Kleangkerng ๖-๒๖๗-๖-๗๖๒๓, Woravut Deenuk ๖-๒๐๔-๖-๘๖๐๘

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Technical Management

Ananta B.

Ananta Boonphet
Scientist (2)

ทะเบียนเลขที่ ๖-๒๖๗-๖-๐๐๐๔

Approved by

Kanitta H.

Kanitta Hemprasatporn
Section Head

ทะเบียนเลขที่ ๖-๒๖๗-๖-๗๒๙๖

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Analysis / Test Report

Client : PTTEP International Limited
222 Moo 1, Tambon Huakao, Amphur Singhanakorn, Songkhla Thailand 90280
P/O : 3450040615
Project Name : PSB Songkhla
Project Location :



TESTING
No.0166

Lot ID: 2384343
Date Received : Aug 02, 2023
Date Reported : Aug 09, 2023
Report Number : 2722616-1

Page 3 of 3

Sample Number : 2384343-3
Sampled Date : Aug 02, 2023 9:47 AM
Sample Description : Wastewater
Location : ปลัดน้ำทิ้งบริเวณท่าเทียบเรือ 3 (Manhole 3)
Date Analysis Commenced : Aug 02, 2023
Condition of Sample : Contained in one amber glass bottle and three plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
BOD (5 days at 20 degree C)	mg/L	-	2.0	<2.0	≤20	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5210 B, part 4500 - O G	Songkhla
COD	mg/L	-	25	<25	≤120	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5220 D	Songkhla
Oil & Grease *	mg/L	-	3	<3	≤5	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5520 B	Songkhla
pH at 25 degree C *	-	-	-	7.6	5.5-9.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500 - H (B)	Songkhla
Total Dissolved Solids Dried at 180 degree C	mg/L	-	5	56	≤3000	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 C	Songkhla
Total Suspended Solids	mg/L	-	5	<5	≤50	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 D	Songkhla

Guideline : Effluent standard for factories, industrial estate and industrial park set by Notification of the Ministry of Natural Resource and Environment and effluent standard for factories and industrial park set by Notification of The Ministry of Industry dated June 07, B.E.2560 (2017).
Sampling By : Sirichai Kleangkerd ทะเบียนเลขที่ 7-267-7-7623 , Woravut Deenuk ทะเบียนเลขที่ 7-204-7-8608

Remark :
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Technical Management

Ananta B.

Ananta Boonphet
Scientist (2)
ทะเบียนเลขที่ 7-267-7-0004

Approved by

Kanitta H.

Kanitta Hemprasatporn
Section Head
ทะเบียนเลขที่ 7-267-7-7296

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Analysis / Test Report

Client : PTTEP International Limited
222 Moo 1, Tambon Huakao, Amphur Singhanakorn, Songkhla Thailand 90280
P/O : 3450040615
Project Name : PSB Songkhla
Project Location :



TESTING
No.0166

Lot ID: 2384351
Date Received : Aug 02, 2023
Date Reported : Aug 09, 2023
Report Number : 2722623-1

Page 1 of 2

Sample Number : 2384351-1
Sampled Date : Aug 02, 2023 10:36 AM
Sample Description : Wastewater
Location : บริเวณอาคารบัญชาการ
Date Analysis Commenced : Aug 02, 2023
Condition of Sample : Contained in one amber glass bottle and three plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
BOD *	mg/L	-	2	12.4	≤40	Based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5210 B	Songkhla
COD	mg/L	-	25	77	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5220 D	Songkhla
Oil & Grease *	mg/L	-	3	<3	≤20	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5520 B	Songkhla
pH at 25 degree C *	-	-	-	7.3	5.0-9.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500 - H (B)	Songkhla
Total Dissolved Solids Dried at 103-105 degree C *	mg/L	-	5	456	(1)	In-house method : STM 04-010 based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 C	Songkhla
Total Suspended Solids	mg/L	-	5	13	≤50	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 D	Songkhla

Guideline : Notification of Ministry of Natural Resources and Environment November, 7, B.E. 2548 on Effluent Control Standard from Types and Sized of Buildings, Type C.

(1) : The values are in addition to the Total Dissolved Solids of the water used not more than 500 mg/L.

Sampling By : Sirichai Kleangkerd ทะเบียนเลขที่ 7-267-7-7623 , Woravut Deenuk ทะเบียนเลขที่ 7-204-7-8608

Remark :
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Technical Management

Ananta B.

Ananta Boonphet
Scientist (2)
ทะเบียนเลขที่ 7-267-7-0004

Approved by

Kanitta H.

Kanitta Hemprasatporn
Section Head
ทะเบียนเลขที่ 7-267-7-7296

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Analysis / Test Report

Client : PTTEP International Limited

222 Moo 1, Tambon Huakao, Amphur Singhanakorn, Songkhla Thailand 90280

P/O : 3450040615

Project Name : PSB Songkhla

Project Location :



TESTING
No.0166

Lot ID: 2384351

Date Received : Aug 02, 2023

Date Reported : Aug 09, 2023

Report Number : 2722623-1

Page 2 of 2

Sample Number	2384351-2
Sampled Date	Aug 02, 2023 10:48 AM
Sample Description	Wastewater
Location	จุดรวมน้ำทิ้งจากอาคารปฏิบัติการและโรงอาหาร
Date Analysis Commenced	Aug 02, 2023
Condition of Sample	Contained in one amber glass bottle and three plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
BOD *	mg/L	-	2	3.3	≤40	Based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5210 B	Songkhla
COD	mg/L	-	25	35	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5220 D	Songkhla
Oil & Grease *	mg/L	-	3	<3	≤20	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5520 B	Songkhla
pH at 25 degree C *	-	-	-	7.4	5.0-9.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500 - H (B)	Songkhla
Total Dissolved Solids Dried at 103-105 degree C *	mg/L	-	5	284	(1)	In-house method : STM 04-010 based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 C	Songkhla
Total Suspended Solids	mg/L	-	5	<5	≤50	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 D	Songkhla

Guideline : Notification of Ministry of Natural Resources and Environment November, 7, B.E. 2548 on Effluent Control Standard from Types and Sized of Buildings, Type C.

(1) : The values are in addition to the Total Dissolved Solids of the water used not more than 500 mg/L.

Sampling By : Sirichai Kleangkerd โทร 09-267-4-7623, Woravut Deenuk โทร 09-204-4-8608

Remark :

- LOD : Limit of Detection
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- The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Technical Management

Ananta B.

Ananta Boonphet
Scientist (2)

ทะเบียนเลขที่ 2-267-4-0004

Approved by

Kanitta H.

Kanitta Hemprasatporn
Section Head

ทะเบียนเลขที่ 2-267-4-7296

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Analysis / Test Report

Client : PTTEP International Limited

222 Moo 1, Tambon Huakao, Amphur Singhanakorn, Songkhla Thailand 90280

P/O : 3450040615

Project Name : PSB Songkhla

Project Location :



TESTING
No.0166

Lot ID: 2399383

Date Received : Sep 06, 2023

Date Reported : Sep 13, 2023

Report Number : 2755756-1

Page 1 of 3

Sample Number	2399383-1
Sampled Date	Sep 06, 2023 9:32 AM
Sample Description	Wastewater
Location	ปล่องน้ำทิ้งบริเวณท่าเทียบเรือ 1 (Manhole 1)
Date Analysis Commenced	Sep 06, 2023
Condition of Sample	Contained in one amber glass bottle and three plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
BOD (5 days at 20 degree C)	mg/L	-	2.0	<2.0	≤20	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5210 B, part 4500 - O G	Songkhla
COD	mg/L	-	25	<25	≤120	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5220 D	Songkhla
Oil & Grease *	mg/L	-	3	<3	≤5	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5520 B	Songkhla
pH at 25 degree C *	-	-	-	8.0	5.5-9.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500 - H (B)	Songkhla
Total Dissolved solids Dried at 180 degree C	mg/L	-	5	60	≤3000	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 C	Songkhla
Total Suspended Solids	mg/L	-	5	16	≤50	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 D	Songkhla

Guideline : Effluent standard for factories, industrial estate and industrial park set by Notification of the Ministry of Natural Resource and Environment and effluent standard for factories and industrial park set by Notification of The Ministry of Industry dated June 07, B.E.2560 (2017).

Sampling By : Somsak Junkong โทร 09-267-4-8341, Woravut Deenuk โทร 09-204-4-8608

Remark :

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Technical Management

Ananta B.

Ananta Boonphet
Scientist (2)

ทะเบียนเลขที่ 2-267-4-0004

Approved by

Kanitta H.

Kanitta Hemprasatporn
Section Head

ทะเบียนเลขที่ 2-267-4-7296

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Analysis / Test Report

Client : PTTEP International Limited
222 Moo 1, Tambon Huakao, Amphur Singhanakorn, Songkhla Thailand 90280
P/O : 3450040615
Project Name : PSB Songkhla
Project Location :



TESTING
No.0166

Lot ID: 2399383
Date Received : Sep 06, 2023
Date Reported : Sep 13, 2023
Report Number : 2755756-1

Page 2 of 3

Sample Number : 2399383-2
Sampled Date : Sep 06, 2023 9:28 AM
Sample Description : Wastewater
Location : บ่อกำจัดน้ำทิ้งบริเวณท่าเทียบเรือ 2 (Manhole 2)
Date Analysis Commenced : Sep 06, 2023
Condition of Sample : Contained in one amber glass bottle and three plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
BOD (5 days at 20 degree C)	mg/L	-	2.0	<2.0	≤20	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5210 B, part 4500 - O G	Songkhla
COD	mg/L	-	25	<25	≤120	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5220 D	Songkhla
Oil & Grease *	mg/L	-	3	<3	≤5	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5520 B	Songkhla
pH at 25 degree C *		-	-	7.9	5.5-9.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500 - H (B)	Songkhla
Total Dissolved solids Dried at 180 degree C	mg/L	-	5	52	≤3000	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 C	Songkhla
Total Suspended Solids	mg/L	-	5	<5	≤50	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 D	Songkhla

Guideline : Effluent standard for factories, industrial estate and industrial park set by Notification of the Ministry of Natural Resource and Environment and effluent standard for factories and industrial park set by Notification of The Ministry of Industry dated June 07, B.E.2560 (2017).

Sampling By : Somsak Junkong โทร 08-267-4-8341 , Woravut Deenuk โทร 08-204-4-8608

Remark :

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Technical Management

Ananta B.

Ananta Boonphet
Scientist (2)
ทะเบียนเลขที่ 2-267-4-0004

Approved by

Kanitta H.

Kanitta Hemprasatporn
Section Head
ทะเบียนเลขที่ 2-267-4-7296

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Analysis / Test Report

Client : PTTEP International Limited
222 Moo 1, Tambon Huakao, Amphur Singhanakorn, Songkhla Thailand 90280
P/O : 3450040615
Project Name : PSB Songkhla
Project Location :



TESTING
No.0166

Lot ID: 2399383
Date Received : Sep 06, 2023
Date Reported : Sep 13, 2023
Report Number : 2755756-1

Page 3 of 3

Sample Number : 2399383-3
Sampled Date : Sep 06, 2023 9:20 AM
Sample Description : Wastewater
Location : บ่อกำจัดน้ำทิ้งบริเวณท่าเทียบเรือ 3 (Manhole 3)
Date Analysis Commenced : Sep 06, 2023
Condition of Sample : Contained in one amber glass bottle and three plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
BOD (5 days at 20 degree C)	mg/L	-	2.0	<2.0	≤20	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5210 B, part 4500 - O G	Songkhla
COD	mg/L	-	25	<25	≤120	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5220 D	Songkhla
Oil & Grease *	mg/L	-	3	<3	≤5	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5520 B	Songkhla
pH at 25 degree C *		-	-	7.8	5.5-9.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500 - H (B)	Songkhla
Total Dissolved solids Dried at 180 degree C	mg/L	-	5	26	≤3000	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 C	Songkhla
Total Suspended Solids	mg/L	-	5	<5	≤50	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 D	Songkhla

Guideline : Effluent standard for factories, industrial estate and industrial park set by Notification of the Ministry of Natural Resource and Environment and effluent standard for factories and industrial park set by Notification of The Ministry of Industry dated June 07, B.E.2560 (2017).

Sampling By : Somsak Junkong โทร 08-267-4-8341 , Woravut Deenuk โทร 08-204-4-8608

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Technical Management

Ananta B.

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Scientist (2)
ทะเบียนเลขที่ 2-267-4-0004

Approved by

Kanitta H.

Kanitta Hemprasatporn
Section Head
ทะเบียนเลขที่ 2-267-4-7296

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Analysis / Test Report

Client : PTTEP International Limited

222 Moo 1, Tambon Huakao, Amphur Singhanakorn, Songkhla Thailand 90280

P/O : 3450040615

Project Name : PSB Songkhla

Project Location :



TESTING
No.0166

Lot ID: 2399385

Date Received : Sep 06, 2023

Date Reported : Sep 13, 2023

Report Number : 2755762-1

Page 1 of 2

Sample Number	2399385-1
Sampled Date	Sep 06, 2023 11:00 AM
Sample Description	Wastewater
Location	บริเวณอาคารนิคมอุตสาหกรรม
Date Analysis Commenced	Sep 06, 2023
Condition of Sample	Contained in one amber glass bottle and three plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
BOD *	mg/L	-	2	10.1	≤40	Based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5210 B	Songkhla
COD	mg/L	-	25	95	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5220 D	Songkhla
Oil & Grease	mg/L	-	3	3	≤20	In-house method : STM 13-006 based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5520 B	Songkhla
pH at 25 degree C	-	-	-	7.8	5.0-9.0	In-house method : STM 13-001 based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500 - H (B)	Songkhla
Total Dissolved Solids Dried at 103-105 degree C *	mg/L	-	5	452	(1)	In-house method : STM 04-010 based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 C	Songkhla
Total Suspended Solids	mg/L	-	5	18	≤50	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 D	Songkhla

Guideline : Notification of Ministry of Natural Resources and Environment November,7 ,B.E. 2548 on Effluent Control Standard from Types and Sized of Buildings, Type C.

(1) : The values are in addition to the Total Dissolved Solids of the water used not more than 500 mg/L.

Sampling By : Somsak Junkong , Woravut Deenuk

Remark :

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Approved by

Ananta B.

Ananta Boonphet
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Analysis / Test Report

Client : PTTEP International Limited

222 Moo 1, Tambon Huakao, Amphur Singhanakorn, Songkhla Thailand 90280

P/O : 3450040615

Project Name : PSB Songkhla

Project Location :



TESTING
No.0166

Lot ID: 2399385

Date Received : Sep 06, 2023

Date Reported : Sep 13, 2023

Report Number : 2755762-1

Page 2 of 2

Sample Number	2399385-2
Sampled Date	Sep 06, 2023 10:55 AM
Sample Description	Wastewater
Location	จุดรวมน้ำทิ้งจากอาคารนิคมอุตสาหกรรมและโรงอาหาร
Date Analysis Commenced	Sep 06, 2023
Condition of Sample	Contained in one amber glass bottle and three plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
BOD *	mg/L	-	2	3.4	≤40	Based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5210 B	Songkhla
COD	mg/L	-	25	46	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5220 D	Songkhla
Oil & Grease	mg/L	-	3	<3	≤20	In-house method : STM 13-006 based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5520 B	Songkhla
pH at 25 degree C	-	-	-	7.8	5.0-9.0	In-house method : STM 13-001 based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500 - H (B)	Songkhla
Total Dissolved Solids Dried at 103-105 degree C *	mg/L	-	5	280	(1)	In-house method : STM 04-010 based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 C	Songkhla
Total Suspended Solids	mg/L	-	5	6	≤50	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 D	Songkhla

Guideline : Notification of Ministry of Natural Resources and Environment November,7 ,B.E. 2548 on Effluent Control Standard from Types and Sized of Buildings, Type C.

(1) : The values are in addition to the Total Dissolved Solids of the water used not more than 500 mg/L.

Sampling By : Somsak Junkong , Woravut Deenuk

Remark :

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Approved by

Ananta B.

Ananta Boonphet
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Analysis / Test Report

Client : PTTEP International Limited
222 Moo 1, Tambon Huakao, Amphur Singhanakorn, Songkhla Thailand 90280
P/O : 3450040615
Project Name : PSB Songkhla
Project Location :



TESTING
No.0166

Lot ID: 23111564
Date Received : Oct 04, 2023
Date Reported : Oct 11, 2023
Report Number : 2786929-1

Page 1 of 3

Sample Number : 23111564-1
Sampled Date : Oct 04, 2023 9:25 AM
Sample Description : Wastewater
Location : บ่อพักน้ำทิ้งบริเวณท่าเทียบเรือ 1 (Manhole 1)
Date Analysis Commenced : Oct 04, 2023
Condition of Sample : Contained in one amber glass bottle and three plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
BOD (5 days at 20 degree C)	mg/L	-	2.0	<2.0	≤20	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5210 B, part 4500 - O G	Songkhla
COD	mg/L	-	25	<25	≤120	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5220 D	Songkhla
Oil & Grease *	mg/L	-	3	<3	≤5	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5520 B	Songkhla
pH at 25 degree C *	-	-	-	7.6	5.5-9.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500 - H (B)	Songkhla
Total Dissolved solids Dried at 180 degree C	mg/L	-	5	52	≤3000	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 C	Songkhla
Total Suspended Solids	mg/L	-	5	37	≤50	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 D	Songkhla

Guideline : Effluent standard for factories, industrial estate and industrial park set by Notification of the Ministry of Natural Resource and Environment and effluent standard for factories and industrial park set by Notification of The Ministry of Industry dated June 07, B.E.2560 (2017).
Sampling By : Somsak Junkong ทะเบียนเลขที่ 7-267-ก-0011 , Narathorn Keawpongsa

Remark :
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Technical Management

Ananta B.

Ananta Boonphet
Scientist (2)
ทะเบียนเลขที่ 7-267-ก-0004

Approved by

Kanitta H.

Kanitta Hemprasatporn
Section Head
ทะเบียนเลขที่ 7-267-ก-0001

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Analysis / Test Report

Client : PTTEP International Limited
222 Moo 1, Tambon Huakao, Amphur Singhanakorn, Songkhla Thailand 90280
P/O : 3450040615
Project Name : PSB Songkhla
Project Location :



TESTING
No.0166

Lot ID: 23111564
Date Received : Oct 04, 2023
Date Reported : Oct 11, 2023
Report Number : 2786929-1

Page 2 of 3

Sample Number : 23111564-2
Sampled Date : Oct 04, 2023 9:20 AM
Sample Description : Wastewater
Location : บ่อพักน้ำทิ้งบริเวณท่าเทียบเรือ 2 (Manhole 2)
Date Analysis Commenced : Oct 04, 2023
Condition of Sample : Contained in one amber glass bottle and three plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
BOD (5 days at 20 degree C)	mg/L	-	2.0	<2.0	≤20	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5210 B, part 4500 - O G	Songkhla
COD	mg/L	-	25	<25	≤120	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5220 D	Songkhla
Oil & Grease *	mg/L	-	3	<3	≤5	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5520 B	Songkhla
pH at 25 degree C *	-	-	-	7.6	5.5-9.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500 - H (B)	Songkhla
Total Dissolved solids Dried at 180 degree C	mg/L	-	5	68	≤3000	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 C	Songkhla
Total Suspended Solids	mg/L	-	5	5	≤50	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 D	Songkhla

Guideline : Effluent standard for factories, industrial estate and industrial park set by Notification of the Ministry of Natural Resource and Environment and effluent standard for factories and industrial park set by Notification of The Ministry of Industry dated June 07, B.E.2560 (2017).
Sampling By : Somsak Junkong ทะเบียนเลขที่ 7-267-ก-0011 , Narathorn Keawpongsa

Remark :
- LOD : Limit of Detection
- "<" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)
- Analyte(s) marked * is/are not included in scope of Accreditation ISO/IEC 17025.
- The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Technical Management

Ananta B.

Ananta Boonphet
Scientist (2)
ทะเบียนเลขที่ 7-267-ก-0004

Approved by

Kanitta H.

Kanitta Hemprasatporn
Section Head
ทะเบียนเลขที่ 7-267-ก-0001

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Analysis / Test Report

Client : PTTEP International Limited
222 Moo 1, Tambon Huakao, Amphur Singhanakorn, Songkhla Thailand 90280
P/O : 3450040615
Project Name : PSB Songkhla
Project Location :



TESTING
No.0166

Lot ID: 23111564
Date Received : Oct 04, 2023
Date Reported : Oct 11, 2023
Report Number : 2786929-1

Page 3 of 3

Sample Number 23111564-3
Sampled Date Oct 04, 2023 9:15 AM
Sample Description Wastewater
Location บ่อพักน้ำทิ้งบริเวณท่าเทียบเรือ 3 (Manhole 3)
Date Analysis Commenced Oct 04, 2023
Condition of Sample Contained in one amber glass bottle and three plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
BOD (5 days at 20 degree C)	mg/L	-	2.0	<2.0	≤20	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5210 B, part 4500 - O G	Songkhla
COD	mg/L	-	25	<25	≤120	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5220 D	Songkhla
Oil & Grease *	mg/L	-	3	<3	≤5	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5520 B	Songkhla
pH at 25 degree C *	-	-	-	7.7	5.5-9.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500 - H (B)	Songkhla
Total Dissolved solids Dried at 180 degree C	mg/L	-	5	52	≤3000	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 C	Songkhla
Total Suspended Solids	mg/L	-	5	6	≤50	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 D	Songkhla

Guideline : Effluent standard for factories, industrial estate and industrial park set by Notification of the Ministry of Natural Resource and Environment and effluent standard for factories and industrial park set by Notification of The Ministry of Industry dated June 07, B.E.2560 (2017).

Sampling By : Somsak Junkong โทร: 09-267-3-0011, Narathorn Keawpongse

Remark :

- LOD : Limit of Detection
- "<" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)
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Technical Management

Ananta B.

Ananta Boonphet
Scientist (2)

โทร: 09-267-3-0004

Approved by

Kanitta H.

Kanitta Hemprasatporn
Section Head

โทร: 09-267-3-0001

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Analysis / Test Report

Client : PTTEP International Limited
222 Moo 1, Tambon Huakao, Amphur Singhanakorn, Songkhla Thailand 90280
P/O : 3450040615
Project Name : PSB Songkhla
Project Location :



TESTING
No.0166

Lot ID: 23111565
Date Received : Oct 04, 2023
Date Reported : Oct 11, 2023
Report Number : 2786930-1

Page 1 of 2

Sample Number 23111565-1
Sampled Date Oct 04, 2023 11:30 AM
Sample Description Wastewater
Location บ่อพักน้ำทิ้งบริเวณท่าเทียบเรือ 3 (Manhole 3)
Date Analysis Commenced Oct 04, 2023
Condition of Sample Contained in one amber glass bottle and three plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
BOD *	mg/L	-	2	26.0	≤40	Based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5210 B	Songkhla
COD	mg/L	-	25	143	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5220 D	Songkhla
Oil & Grease	mg/L	-	3	<3	≤20	In-house method : STM 13-006 based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5520 B	Songkhla
pH at 25 degree C	-	-	-	8.1	5.0-9.0	In-house method : STM 13-001 based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500 - H (B)	Songkhla
Total Dissolved Solids Dried at 103-105 degree C *	mg/L	-	5	452	(1)	In-house method : STM 04-010 based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 C	Songkhla
Total Suspended Solids	mg/L	-	5	35	≤50	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 D	Songkhla

Guideline : Notification of Ministry of Natural Resources and Environment November, 7, B.E. 2548 on Effluent Control Standard from Types and Sized of Buildings, Type C.

(1) : The values are in addition to the Total Dissolved Solids of the water used not more than 500 mg/L.

Sampling By : Somsak Junkong , Narathorn Keawpongse

Remark :

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Analysis / Test Report

Client : PTTEP International Limited
222 Moo 1, Tambon Huakao, Amphur Singhanakorn, Songkhla Thailand 90280
P/O : 3450040615
Project Name : PSB Songkhla
Project Location :



TESTING
No.0166

Lot ID: 23111565
Date Received : Oct 04, 2023
Date Reported : Oct 11, 2023
Report Number : 2786930-1

Page 2 of 2

Sample Number 23111565-2
Sampled Date Oct 04, 2023 11:45 AM
Sample Description Wastewater
Location จครมน้ำทิ้งจากอาคารบัญชาการและโรงอาหาร
Date Analysis Commenced Oct 04, 2023
Condition of Sample Contained in one amber glass bottle and three plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
BOD *	mg/L	-	2	18.9	≤40	Based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5210 B	Songkhla
COD	mg/L	-	25	84	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5220 D	Songkhla
Oil & Grease	mg/L	-	3	<3	≤20	In-house method : STM 13-006 based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5520 B	Songkhla
pH at 25 degree C	-	-	-	7.9	5.0-9.0	In-house method : STM 13-001 based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500 - H (B)	Songkhla
Total Dissolved Solids Dried at 103-105 degree C *	mg/L	-	5	260	(1)	In-house method : STM 04-010 based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 C	Songkhla
Total Suspended Solids	mg/L	-	5	20	≤50	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 D	Songkhla

Guideline : Notification of Ministry of Natural Resources and Environment November, 7, B.E. 2548 on Effluent Control Standard from Types and Sized of Buildings, Type C.

(1) : The values are in addition to the Total Dissolved Solids of the water used not more than 500 mg/L.

Sampling By : Somsak Junkong , Narathorn Keawpongasa

Remark :

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Approved by

Ananta B.

Ananta Boonphet
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Analysis / Test Report

Client : PTTEP International Limited
222 Moo 1, Tambon Huakao, Amphur Singhanakorn, Songkhla Thailand 90280
P/O : 3450040615
Project Name : PSB Songkhla
Project Location :



TESTING
No.0166

Lot ID: 23111566
Date Received : Oct 04, 2023
Date Reported : Oct 11, 2023
Report Number : 2786931-1

Page 1 of 1

Sample Number 23111566-1
Sampled Date Oct 04, 2023 10:05 AM
Sample Description Wastewater
Location Chemical transit area
Date Analysis Commenced Oct 04, 2023
Condition of Sample Contained in one amber glass bottle and three plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
BOD (5 days at 20 degree C)	mg/L	-	2.0	<2.0	≤20	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5210 B, part 4500 - O G	Songkhla
COD	mg/L	-	25	<25	≤120	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5220 D	Songkhla
Oil & Grease *	mg/L	-	3	<3	≤5	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5520 B	Songkhla
pH at 25 degree C *	-	-	-	8.1	5.5-9.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500 - H (B)	Songkhla
Total Dissolved solids Dried at 180 degree C	mg/L	-	5	64	≤3000	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 C	Songkhla
Total Suspended Solids	mg/L	-	5	34	≤50	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 D	Songkhla

Guideline : Effluent standard for factories, industrial estate and industrial park set by Notification of the Ministry of Natural Resource and Environment and effluent standard for factories and industrial park set by Notification of The Ministry of Industry dated June 07, B.E.2560 (2017).

Sampling By : Somsak Junkong ทะเบียนเลขที่ 2-267-2-0011 , Narathorn Keawpongasa

Remark :

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Technical Management

Ananta B.

Ananta Boonphet
Scientist (2)

ทะเบียนเลขที่ 2-267-2-0004

Approved by

Kanitta H.

Kanitta Hemprasatporn
Section Head
ทะเบียนเลขที่ 2-267-2-0001

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Analysis / Test Report

Client : PTTEP International Limited

222 Moo 1, Tambon Huakao, Amphur Singhanakorn, Songkhla Thailand 90280

P/O : 3450040615

Project Name : PSB Songkhla

Project Location :



TESTING
No.0166

Lot ID: 23122677

Date Received : Nov 01, 2023

Date Reported : Nov 08, 2023

Report Number : 2812750-1

Page 1 of 3

Sample Number	23122677-1
Sampled Date	Nov 01, 2023 9:53 AM
Sample Description	Wastewater
Location	บ่อกักน้ำทิ้งบริเวณท่าเทียบเรือ 1 (Manhole 1)
Date Analysis Commenced	Nov 01, 2023
Condition of Sample	Contained in one amber glass bottle and three plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
BOD (5 days at 20 degree C)	mg/L	-	2.0	9.5	≤20	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5210 B, part 4500 - O G	Songkhla
COD	mg/L	-	25	46	≤120	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5220 D	Songkhla
Oil & Grease *	mg/L	-	3	<3	≤5	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5520 B	Songkhla
pH at 25 degree C *	-	-	-	7.3	5.5-9.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500 - H (B)	Songkhla
Total Dissolved solids Dried at 180 degree C	mg/L	-	5	66	≤3000	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 C	Songkhla
Total Suspended Solids	mg/L	-	5	12	≤50	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 D	Songkhla

Guideline : Effluent standard for factories, industrial estate and industrial park set by Notification of the Ministry of Natural Resource and Environment and effluent standard for factories and industrial park set by Notification of The Ministry of Industry dated June 07, B.E.2560 (2017).

Sampling By : Somsak Junkong โทร: 09-0011-267-4-0011, Woravut Deenuk โทร: 09-0011-204-4-8608

Remark :

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Technical Management

Ananta B.

Ananta Boonphet
Scientist (2)

โทร: 09-0011-267-4-0004

Approved by

Kanitta H.

Kanitta Hemprasatporn
Section Head

โทร: 09-0011-267-4-0001

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Analysis / Test Report

Client : PTTEP International Limited

222 Moo 1, Tambon Huakao, Amphur Singhanakorn, Songkhla Thailand 90280

P/O : 3450040615

Project Name : PSB Songkhla

Project Location :



TESTING
No.0166

Lot ID: 23122677

Date Received : Nov 01, 2023

Date Reported : Nov 08, 2023

Report Number : 2812750-1

Page 2 of 3

Sample Number	23122677-2
Sampled Date	Nov 01, 2023 9:50 AM
Sample Description	Wastewater
Location	บ่อกักน้ำทิ้งบริเวณท่าเทียบเรือ 2 (Manhole 2)
Date Analysis Commenced	Nov 01, 2023
Condition of Sample	Contained in one amber glass bottle and three plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
BOD (5 days at 20 degree C)	mg/L	-	2.0	<2.0	≤20	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5210 B, part 4500 - O G	Songkhla
COD	mg/L	-	25	<25	≤120	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5220 D	Songkhla
Oil & Grease *	mg/L	-	3	<3	≤5	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5520 B	Songkhla
pH at 25 degree C *	-	-	-	7.4	5.5-9.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500 - H (B)	Songkhla
Total Dissolved solids Dried at 180 degree C	mg/L	-	5	54	≤3000	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 C	Songkhla
Total Suspended Solids	mg/L	-	5	<5	≤50	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 D	Songkhla

Guideline : Effluent standard for factories, industrial estate and industrial park set by Notification of the Ministry of Natural Resource and Environment and effluent standard for factories and industrial park set by Notification of The Ministry of Industry dated June 07, B.E.2560 (2017).

Sampling By : Somsak Junkong โทร: 09-0011-267-4-0011, Woravut Deenuk โทร: 09-0011-204-4-8608

Remark :

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Technical Management

Ananta B.

Ananta Boonphet
Scientist (2)

โทร: 09-0011-267-4-0004

Approved by

Kanitta H.

Kanitta Hemprasatporn
Section Head

โทร: 09-0011-267-4-0001

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Analysis / Test Report

Client : PTTEP International Limited
222 Moo 1, Tambon Huakao, Amphur Singhanakorn, Songkhla Thailand 90280
P/O : 3450040615
Project Name : PSB Songkhla
Project Location :



TESTING
No.0166

Lot ID: 23122677
Date Received : Nov 01, 2023
Date Reported : Nov 08, 2023
Report Number : 2812750-1

Page 3 of 3

Sample Number 23122677-3
Sampled Date Nov 01, 2023 9:43 AM
Sample Description Wastewater
Location บ่อพักน้ำทิ้งบริเวณท่าเทียบเรือ 3 (Manhole 3)
Date Analysis Commenced Nov 01, 2023
Condition of Sample Contained in one amber glass bottle and three plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
BOD (5 days at 20 degree C)	mg/L	-	2.0	<2.0	≤20	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5210 B, part 4500 - O G	Songkhla
COD	mg/L	-	25	<25	≤120	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5220 D	Songkhla
Oil & Grease *	mg/L	-	3	<3	≤5	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5520 B	Songkhla
pH at 25 degree C *	-	-	-	7.4	5.5-9.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500 - H (B)	Songkhla
Total Dissolved solids Dried at 180 degree C	mg/L	-	5	31	≤3000	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 C	Songkhla
Total Suspended Solids	mg/L	-	5	<5	≤50	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 D	Songkhla

Guideline : Effluent standard for factories, industrial estate and industrial park set by Notification of the Ministry of Natural Resource and Environment and effluent standard for factories and industrial park set by Notification of The Ministry of Industry dated June 07, B.E.2560 (2017).

Sampling By : Somsak Junkong โทร.09-267-3-0011, Woravut Deenuk โทร.09-267-3-8608

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Technical Management

Ananta B

Ananta Boonphet
Scientist (2)

โทร.09-267-3-0004

Approved by

Kanitta H

Kanitta Hemprasatporn
Section Head
โทร.09-267-3-0001

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Analysis / Test Report

Client : PTTEP International Limited
222 Moo 1, Tambon Huakao, Amphur Singhanakorn, Songkhla Thailand 90280
P/O : 3450040615
Project Name : PSB Songkhla
Project Location :



TESTING
No.0166

Lot ID: 23122680
Date Received : Nov 01, 2023
Date Reported : Nov 08, 2023
Report Number : 2812753-1

Page 1 of 2

Sample Number 23122680-1
Sampled Date Nov 01, 2023 11:28 AM
Sample Description Wastewater
Location บริเวณอาคารบัญชาการ
Date Analysis Commenced Nov 01, 2023
Condition of Sample Contained in one amber glass bottle and three plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
BOD *	mg/L	-	2	18.7	≤40	Based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5210 B	Songkhla
COD	mg/L	-	25	94	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5220 D	Songkhla
Oil & Grease	mg/L	-	3	5	≤20	In-house method : STM 13-006 based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5520 B	Songkhla
pH at 25 degree C	-	-	-	7.8	5.0-9.0	In-house method : STM 13-001 based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500 - H (B)	Songkhla
Total Dissolved Solids Dried at 103-105 degree C *	mg/L	-	5	376	(1)	In-house method : STM 04-010 based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 C	Songkhla
Total Suspended Solids	mg/L	-	5	19	≤50	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 D	Songkhla

Guideline : Notification of Ministry of Natural Resources and Environment November, 7, B.E. 2548 on Effluent Control Standard from Types and Sized of Buildings, Type C.

(1) : The values are in addition to the Total Dissolved Solids of the water used not more than 500 mg/L.

Sampling By : Somsak Junkong, Woravut Deenuk

Remark :

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Analysis / Test Report

Client : PTTEP International Limited

222 Moo 1, Tambon Huakao, Amphur Singhanakorn, Songkhla Thailand 90280

P/O : 3450040615

Project Name : PSB Songkhla

Project Location :



TESTING
No.0166

Lot ID: 23122680

Date Received : Nov 01, 2023

Date Reported : Nov 08, 2023

Report Number : 2812753-1

Page 2 of 2

Sample Number	23122680-2
Sampled Date	Nov 01, 2023 11:55 AM
Sample Description	Wastewater
Location	จุดรวมน้ำทิ้งจากอาคารบัญชาการและโรงงาน
Date Analysis Commenced	Nov 01, 2023
Condition of Sample	Contained in one amber glass bottle and three plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
BOD *	mg/L	-	2	8.0	≤40	Based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5210 B	Songkhla
COD	mg/L	-	25	<25	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5220 D	Songkhla
Oil & Grease	mg/L	-	3	<3	≤20	In-house method : STM 13-006 based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5520 B	Songkhla
pH at 25 degree C	-	-	-	7.7	5.0-9.0	In-house method : STM 13-001 based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500 - H (B)	Songkhla
Total Dissolved Solids Dried at 103-105 degree C *	mg/L	-	5	52	(1)	In-house method : STM 04-010 based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 C	Songkhla
Total Suspended Solids	mg/L	-	5	30	≤50	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 D	Songkhla

Guideline : Notification of Ministry of Natural Resources and Environment November, 7, B.E. 2548 on Effluent Control Standard from Types and Sized of Buildings, Type C.

(1) : The values are in addition to the Total Dissolved Solids of the water used not more than 500 mg/L.

Sampling By : Somsak Junkong , Woravut Deenuk

Remark :

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Approved by

Ananta B.

Ananta Boonphet
Scientist (2)

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Analysis / Test Report

Client : PTTEP International Limited

222 Moo 1, Tambon Huakao, Amphur Singhanakorn, Songkhla Thailand 90280

P/O : 3450040615

Project Name : PSB Songkhla

Project Location :



TESTING
No.0166

Lot ID: 23131386

Date Received : Dec 06, 2023

Date Reported : Dec 13, 2023

Report Number : 2831806-1

Page 1 of 3

Sample Number	23131386-1
Sampled Date	Dec 06, 2023 9:53 AM
Sample Description	Wastewater
Location	บ่อดักน้ำทิ้งบริเวณท่าเทียบเรือ 1 (Manhole 1)
Date Analysis Commenced	Dec 06, 2023
Condition of Sample	Contained in one amber glass bottle and three plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
BOD (5 days at 20 degree C)	mg/L	-	2.0	<2.0	≤20	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5210 B, part 4500 - O G	Songkhla
COD	mg/L	-	25	<25	≤120	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5220 D	Songkhla
Oil & Grease *	mg/L	-	3	<3	≤5	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5520 B	Songkhla
pH at 25 degree C *	-	-	-	8.5	5.5-9.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500 - H (B)	Songkhla
Total Dissolved solids Dried at 180 degree C	mg/L	-	5	39	≤3000	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 C	Songkhla
Total Suspended Solids	mg/L	-	5	8	≤50	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 D	Songkhla

Guideline : Effluent standard for factories, industrial estate and industrial park set by Notification of the Ministry of Natural Resource and Environment and effluent standard for factories and industrial park set by Notification of The Ministry of Industry dated June 07, B.E.2560 (2017).

Sampling By : Sirichai Kleangkerd วัฒนธเนศวร์ 2-267-4-0010 , Tana Supapan

Remark :

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Technical Management

Ananta B.

Ananta Boonphet
Scientist (2)

ทะเบียนเลขที่ 2-267-4-0004

Approved by

Kanitta H.

Kanitta Hemprasatporn
Section Head

ทะเบียนเลขที่ 2-267-4-0001

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Analysis / Test Report

Client : PTTEP International Limited
222 Moo 1, Tambon Huakao, Amphur Singhanakorn, Songkhla Thailand 90280
P/O : 3450040615
Project Name : PSB Songkhla
Project Location :



TESTING
No.0166

Lot ID: 23131386
Date Received : Dec 06, 2023
Date Reported : Dec 13, 2023
Report Number : 2831806-1

Page 2 of 3

Sample Number 23131386-2
Sampled Date Dec 06, 2023 9:45 AM
Sample Description Wastewater
Location บ่อพักน้ำทิ้งบริเวณหน้าเหมืองเรือ 2 (Manhole 2)
Date Analysis Commenced Dec 06, 2023
Condition of Sample Contained in one amber glass bottle and three plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
BOD (5 days at 20 degree C)	mg/L	-	2.0	<2.0	≤20	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5210 B, part 4500 - O G	Songkhla
COD	mg/L	-	25	<25	≤120	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5220 D	Songkhla
Oil & Grease *	mg/L	-	3	<3	≤5	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5520 B	Songkhla
pH at 25 degree C *	-	-	-	7.4	5.5-9.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500 - H (B)	Songkhla
Total Dissolved solids Dried at 180 degree C	mg/L	-	5	58	≤3000	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 C	Songkhla
Total Suspended Solids	mg/L	-	5	<5	≤50	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 D	Songkhla

Guideline : Effluent standard for factories, industrial estate and industrial park set by Notification of the Ministry of Natural Resource and Environment and effluent standard for factories and industrial park set by Notification of The Ministry of Industry dated June 07, B.E.2560 (2017).

Sampling By : Sirichai Kleangkerd ทะเบียนเลขที่ 2-267-2-0010 , Tana Supapan

Remark :

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Technical Management

Ananta B.
Ananta Boonphet
Scientist (2)
ทะเบียนเลขที่ 2-267-2-0004

Approved by

Kanitta H.
Kanitta Hemprasatporn
Section Head
ทะเบียนเลขที่ 2-267-2-0001

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Analysis / Test Report

Client : PTTEP International Limited
222 Moo 1, Tambon Huakao, Amphur Singhanakorn, Songkhla Thailand 90280
P/O : 3450040615
Project Name : PSB Songkhla
Project Location :



TESTING
No.0166

Lot ID: 23131386
Date Received : Dec 06, 2023
Date Reported : Dec 13, 2023
Report Number : 2831806-1

Page 3 of 3

Sample Number 23131386-3
Sampled Date Dec 06, 2023 9:30 AM
Sample Description Wastewater
Location บ่อพักน้ำทิ้งบริเวณหน้าเหมืองเรือ 3 (Manhole 3)
Date Analysis Commenced Dec 06, 2023
Condition of Sample Contained in one amber glass bottle and three plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
BOD (5 days at 20 degree C)	mg/L	-	2.0	<2.0	≤20	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5210 B, part 4500 - O G	Songkhla
COD	mg/L	-	25	<25	≤120	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5220 D	Songkhla
Oil & Grease *	mg/L	-	3	<3	≤5	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5520 B	Songkhla
pH at 25 degree C *	-	-	-	7.0	5.5-9.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500 - H (B)	Songkhla
Total Dissolved solids Dried at 180 degree C	mg/L	-	5	37	≤3000	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 C	Songkhla
Total Suspended Solids	mg/L	-	5	<5	≤50	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 D	Songkhla

Guideline : Effluent standard for factories, industrial estate and industrial park set by Notification of the Ministry of Natural Resource and Environment and effluent standard for factories and industrial park set by Notification of The Ministry of Industry dated June 07, B.E.2560 (2017).

Sampling By : Sirichai Kleangkerd ทะเบียนเลขที่ 2-267-2-0010 , Tana Supapan

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Technical Management

Ananta B.
Ananta Boonphet
Scientist (2)
ทะเบียนเลขที่ 2-267-2-0004

Approved by

Kanitta H.
Kanitta Hemprasatporn
Section Head
ทะเบียนเลขที่ 2-267-2-0001

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Analysis / Test Report

Client : PTTEP International Limited

222 Moo 1, Tambon Huakao, Amphur Singhanakorn, Songkhla Thailand 90280

P/O : 3450040615

Project Name : PSB Songkhla

Project Location :



TESTING
No.0166

Lot ID: 23131388

Date Received : Dec 06, 2023

Date Reported : Dec 13, 2023

Report Number : 2831810-1

Page 1 of 2

Sample Number	23131388-1
Sampled Date	Dec 06, 2023 11:47 AM
Sample Description	Wastewater
Location	บริเวณอาคารนิทรรศการ
Date Analysis Commenced	Dec 06, 2023
Condition of Sample	Contained in one amber glass bottle and three plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
BOD *	mg/L	-	2	<2	≤40	Based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5210 B	Songkhla
COD	mg/L	-	25	<25	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5220 D	Songkhla
Oil & Grease	mg/L	-	3	<3	≤20	In-house method : STM 13-006 based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5220 B	Songkhla
pH at 25 degree C	-	-	-	7.8	5.0-9.0	In-house method : STM 13-001 based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500 - H (B)	Songkhla
Total Dissolved Solids Dried at 103-105 degree C *	mg/L	-	5	236	(1)	In-house method : STM 04-010 based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 C	Songkhla
Total Suspended Solids	mg/L	-	5	<5	≤50	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 D	Songkhla

Guideline : Notification of Ministry of Natural Resources and Environment November, 7, B.E. 2548 on Effluent Control Standard from Types and Sized of Buildings, Type C.

(1) : The values are in addition to the Total Dissolved Solids of the water used not more than 500 mg/L.

Sampling By : Sirichai Kleangkerd , Tana Supapan

Remark :

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Approved by

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Ananta Boonphet
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Analysis / Test Report

Client : PTTEP International Limited

222 Moo 1, Tambon Huakao, Amphur Singhanakorn, Songkhla Thailand 90280

P/O : 3450040615

Project Name : PSB Songkhla

Project Location :



TESTING
No.0166

Lot ID: 23131388

Date Received : Dec 06, 2023

Date Reported : Dec 13, 2023

Report Number : 2831810-1

Page 2 of 2

Sample Number	23131388-2
Sampled Date	Dec 06, 2023 11:34 AM
Sample Description	Wastewater
Location	จุดรวมน้ำทิ้งจากอาคารนิทรรศการและโรงอาหาร
Date Analysis Commenced	Dec 06, 2023
Condition of Sample	Contained in one amber glass bottle and three plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
BOD *	mg/L	-	2	3.1	≤40	Based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5210 B	Songkhla
COD	mg/L	-	25	83	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5220 D	Songkhla
Oil & Grease	mg/L	-	3	<3	≤20	In-house method : STM 13-006 based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5220 B	Songkhla
pH at 25 degree C	-	-	-	7.6	5.0-9.0	In-house method : STM 13-001 based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500 - H (B)	Songkhla
Total Dissolved Solids Dried at 103-105 degree C *	mg/L	-	5	380	(1)	In-house method : STM 04-010 based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 C	Songkhla
Total Suspended Solids	mg/L	-	5	9	≤50	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 D	Songkhla

Guideline : Notification of Ministry of Natural Resources and Environment November, 7, B.E. 2548 on Effluent Control Standard from Types and Sized of Buildings, Type C.

(1) : The values are in addition to the Total Dissolved Solids of the water used not more than 500 mg/L.

Sampling By : Sirichai Kleangkerd , Tana Supapan

Remark :

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Approved by

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Ananta Boonphet
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Analysis / Test Report

Client : PTTEP International Limited
222 Moo 1, Tambon Huakao, Amphur Singhanakorn, Songkhla Thailand 90280
P/O : 3450040615
Project Name : PSB Songkhla
Project Location :

TESTING
No.0166
Lot ID: 23131389
Date Received : Dec 06, 2023
Date Reported : Dec 13, 2023
Report Number : 2831811-1

Page 1 of 1

Sample Number 23131389-1
Sampled Date Dec 06, 2023 10:17 AM
Sample Description Wastewater
Location Chemical transit area
Date Analysis Commenced Dec 06, 2023
Condition of Sample Contained in one amber glass bottle and three plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
BOD (5 days at 20 degree C)	mg/L	-	2.0	<2.0	≤20	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5210 B, part 4500 - O G	Songkhla
COD	mg/L	-	25	<25	≤120	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5220 D	Songkhla
Oil & Grease *	mg/L	-	3	<3	≤5	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5520 B	Songkhla
pH at 25 degree C *		-		7.5	5.5-9.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500 - H (B)	Songkhla
Total Dissolved solids Dried at 180 degree C	mg/L	-	5	172	≤3000	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 C	Songkhla
Total Suspended Solids	mg/L	-	5	10	≤50	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 D	Songkhla

Guideline : Effluent standard for factories, industrial estate and industrial park set by Notification of the Ministry of Natural Resource and Environment and effluent standard for factories and industrial park set by Notification of The Ministry of Industry dated June 07, B.E.2560 (2017).

Sampling By : Sirichai Kleangkerd โทร ๖-๒๖๗-๖-๐๐๑๐, Tana Supapan

Remark :
- LOD : Limit of Detection
- "<" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)
- Analyte(s) marked * is/are not included in scope of Accreditation ISO/IEC 17025.
- The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Technical Management

Ananta B.

Ananta Boonphet
Scientist (2)
โทร ๖-๒๖๗-๖-๐๐๐๔

Approved by

Kanitta H.

Kanitta Hemprasatporn
Section Head
โทร ๖-๒๖๗-๖-๐๐๐๑

Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. No part of this report may be reproduced in any form without written consent from the laboratory.
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ภาคผนวก ค-2

รายงานผลการสำรวจบริเวณชายฝั่งทะเล ประจำปี 2566

รายงานผลการสำรวจบริเวณชายฝั่งทะเล

อำเภอสิงหนคร - อำเภอเมือง จังหวัดสงขลา

1. วัตถุประสงค์

สำรวจหาระดับแนวชายฝั่งและความลึกของท้องน้ำเพื่อดูความเปลี่ยนแปลงของชายหาดจากผลกระทบของธรรมชาติและสิ่งแวดล้อม

2. ขอบเขตของงานและระยะเวลาสำรวจ

2.1 ขอบเขตของการสำรวจ

พื้นที่สำรวจเริ่มจากบริเวณท่าเทียบเรือ บริษัท ปตท.สผ. จำกัด (มหาชน) อำเภอสิงหนคร จังหวัดสงขลา สำรวจไปตามแนวชายฝั่งทะเลด้านทิศเหนือระยะทางประมาณ 5,000 เมตร สิ้นสุดที่ค่าพิกัด N-804312 E-669336 และสำรวจลงไปตามด้านทิศใต้ระยะทางประมาณ 5,000 เมตร สิ้นสุดที่ค่าพิกัด N-794209 E-678612 สำรวจออกจากแนวชายฝั่งออกไปทะเลประมาณ 1000 เมตร โดยกำหนดแนวสำรวจทุกๆ 100 เมตร พร้อมทำรูปตัดแนวชายฝั่ง รวมพื้นที่สำรวจประมาณ 10 ตารางกิโลเมตร แสดงดังรูปที่ 1

2.2 ระยะเวลาการสำรวจ

ดำเนินการสำรวจ ตั้งแต่วันที่ 26 มีนาคม ถึง 13 เมษายน 2566 บริเวณสำรวจตั้งแต่อำเภอสิงหนคร ถึง อำเภอเมือง จังหวัดสงขลา



รูปที่ 1 ขอบเขตบริเวณสำรวจ

3. ระบบพิกัดแผนที่

3.1 ระบบพิกัดทางราบ

ใช้ระบบพิกัดแผนที่ ยู.ที.เอ็ม.กริด WGS.1984 Zone 47 (No Datum)

3.2 ระดับอ้างอิงทางตั้ง

ระดับทางตั้ง อ้างอิงจากค่าระดับทะเลปานกลาง (MSL.)

4. หมดหลักฐานแผนที่และหมดอ้างอิงตามชายหาด

4.1 งานตรวจสอบหมดหลักฐาน

ตรวจสอบหมดหลักฐานที่สร้างไว้เมื่อเดือนเมษายน 2550 และซ่อมแซมหรือสร้างใหม่ทดแทนของเก่า หากพบว่าชำรุดหรือสูญหาย แสดงดังภาพที่ 1



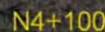
ภาพที่ 1 งานตรวจสอบหมดอ้างอิงแนวชายฝั่ง

ตัวอย่างคำพินิจและคำระดับชั้นอยู่ในตัวอย่างเดิม แสดงดังภาพที่ 2 และรูปที่ 2



BM02

ภาพที่ 2 หีบดินหลักฐาน BM01 BM02



รูปที่ 2 แผนผังชั้นวางของในคลังสินค้า BM01 BM02 ด้วยเทคนิคนี้คือ

ตัวแบ่งคำพืดหเดนลักรรณ ดั่งตารวงที่ 1



BM04

ภาพที่ 3 หุ่นหลักฐาน BM03 BM04



รูปที่ 3 แผนที่แสดงแหล่งโบราณคดี BM03, BM04

ตารางที่ 1 ตำแหน่งพิกัดหลุมหลักฐาน

ชื่อหลุม	ค่าพิกัด		ระดับ (MSL)
	เหนือ (N)	ตะวันออก (E)	
BM.01	804201.768	669409.486	1.993
BM.02	804311.327	669335.832	2.018
BM.03	795238.916	677807.640	2.841
BM.04	794209.223	678602.346	2.064

หมายเหตุ : อ้างอิงระบบค่าพิกัดจาก WGS.84

4.2 งานหลุมอ้างอิงตามชายหาด

จากการตรวจสอบหลุมอ้างอิงตามแนวชายหาดด้านทิศเหนือและทิศใต้ พบว่า ด้านทิศเหนือจากหลุม N4+300 ถึง N3+800 ถูกคลื่นกัดเซาะพังทลาย จึงได้ทำการหล่อและฝังหลุมใหม่ สำหรับตรวจสอบค่าพิกัดและค่าระดับใหม่ โดยหลุม N3+800 ถึง หลุม N1+300 มีการทับถมของตะกอนบนเขื่อนกันคลื่นพัง หลุมอ้างอิงที่ทำได้หายจึงได้สร้างหลุมใหม่ขึ้นมาแทน รวมทั้งทำการสอบค่าพิกัดและค่าระดับใหม่ แสดงดังภาพที่ 4

สำหรับหลุม N1+200 ถึง N0+000 หล่อและฝังหลุมบนเขื่อนกันคลื่น สำหรับตรวจสอบค่าพิกัดและค่าระดับใหม่ มีค่าพิกัดและค่าระดับเท่าเดิม



ภาพที่ 4 การสร้างหลุม N3+800 ถึงหลุม N1+300

ด้านทิศใต้ บริเวณเขื่อนกันคลื่น หมด S0+100, S0+200, S0+300 มีสภาพใช้งานได้ จากการตรวจสอบ
หมดทั้ง 3 หมดมีระดับคงเดิม สำหรับหมดอ้างอิงตามแนวชายฝั่งจากหมด S0+800, S0+900 สูญหายโดยที่
บริเวณส่วนนี้ได้มีการก่อสร้างซ่อมแซมเขื่อนกันคลื่น จึงได้สร้างหมดใหม่ขึ้นมาแทนหมดเดิม

หมด S1+000 ถึง S1+900 มีสภาพที่สมบูรณ์ยังใช้งานได้ ทำการตรวจสอบค่าพิกัดและค่าระดับ แสดงดัง
ภาพที่ 5

หมดอ้างอิงตามแนวชายฝั่งจากหมด S2+000, S2+400 สูญหาย ได้สร้างหมดใหม่ขึ้นมาแทนหมดเดิมทำ
การตรวจสอบค่าพิกัดและค่าระดับ แสดงดังภาพที่ 6

หมด S2+500 ถึง S6+000 มีสภาพที่ยังใช้งานได้ จึงทำการตรวจสอบค่าพิกัดและค่าระดับ แสดงดัง
ภาพที่ 7

สำหรับพิกัดหมดอ้างอิงตามแนวชายหาดด้านทิศเหนือและทิศใต้ แสดงดังตารางที่ 2 และตารางที่ 3
ตามลำดับ



ภาพที่ 5 หมด S1+000 ถึงหมด S1+900



ภาพที่ 6 หมด S2+500 ถึงหมด S6+000



ภาพที่ 7 งานฝั่งหมดใหม่ S2+000 ถึงหมด S2+400

ตารางที่ 2 ตำแหน่งค่าพิกัดหมุดอ้างอิงแนวชายหาดด้านทิศเหนือ

ชื่อหมุด	ค่าพิกัด		ระดับ (MSL)
	เหนือ (N)	ตะวันออก (E)	
BM02	804311.327	669335.832	2.018
BM01	804201.768	669409.486	1.993
N4+300	804121.018	669470.786	1.930
N4+200	804030.499	669519.281	1.843
N4+100	803951.537	669579.218	2.201
N4+000	803870.152	669634.791	1.000
N3+900	803784.809	669696.687	2.344
N3+800	803720.222	669796.293	2.017
N3+700	803644.994	669852.044	2.041
N3+600	803569.011	669907.637	2.004
N3+500	803494.603	669960.747	1.988
N3+400	803416.552	670018.586	2.041
N3+300	803338.939	670076.554	2.080
N3+200	803253.356	670142.848	2.026
N3+100	803182.589	670200.212	1.992
N3+000	803104.374	670264.962	1.936
N2+900	803044.098	670317.323	2.022
N2+800	802957.438	670394.532	1.998
N2+700	802878.712	670464.444	2.017
N2+600	802803.570	670536.535	1.986
N2+500	802737.488	670594.339	2.007
N2+400	802658.193	670667.032	1.982
N2+300	802584.880	670732.132	2.001
N2+200	802508.316	670798.871	1.982
N2+100	802408.847	670881.748	2.023
N2+000	802308.946	670960.980	2.105
N1+900	802188.308	671058.081	2.145
N1+800	802100.980	671130.758	2.163
N1+700	801966.575	671248.533	2.201
N1+600	801864.982	671362.950	2.153
N1+500	801801.956	671448.704	2.140
N1+400	801714.025	671595.532	4.493
N1+300	801659.272	671769.373	4.452

ตารางที่ 2 (ต่อ) ตำแหน่งค่าพิกัดหมุดอ้างอิงแนวชายหาดด้านทิศเหนือ

ชื่อหมุด	ค่าพิกัด		ระดับ (MSL)
	เหนือ (N)	ตะวันออก (E)	
N1+200	801565.851	672084.206	2.964
N1+100	801408.091	672106.107	3.212
N1+000	801296.531	672165.948	3.283
N0+900	801174.706	672231.354	3.233
N0+800	801091.643	672276.306	3.031
N0+700	800987.175	672331.964	3.033
N0+600	800895.464	672379.873	2.822
N0+500	800798.414	672432.994	2.874
N0+400	800700.601	672484.942	2.561
N0+300	800580.322	672549.111	2.832
N0+200	800469.278	672615.755	2.690
N0+100	800383.259	672692.494	2.982
N0+000	800345.123	672866.222	2.752

ตารางที่ 3 ตำแหน่งค่าพิกัดหมุดอ้างอิงแนวชายหาดด้านทิศใต้

ชื่อหมุด	ค่าพิกัด		ระดับ (MSL.)
	เหนือ (N)	ตะวันออก (E)	
S0+100	800197.359	673539.350	2.870
S0+200	800096.264	673615.373	2.880
S0+300	799998.031	673691.391	2.810
S0+800	799560.797	674518.773	1.680
S0+900	799468.398	674670.128	1.380
S1+000	799357.550	674705.108	1.710
S1+100	799249.560	674737.912	1.740
S1+200	799126.392	674798.514	1.760
S1+300	799029.910	674836.829	2.110
S1+400	798953.959	674883.680	1.710
S1+500	798831.668	674919.764	1.780
S1+600	798756.603	674958.708	2.230
S1+700	798645.626	674977.392	1.800
S1+800	798535.031	675027.431	1.770
S1+900	798414.566	675081.706	1.820
S2+000	798317.886	675126.637	1.940
S2+100	798241.277	675182.153	2.090
S2+200	798132.220	675244.702	2.390
S2+300	797999.736	675257.709	2.720
S2+400	797899.457	675340.536	1.940
S2+500	797830.318	676303.058	3.945
S2+600	797702.620	676377.411	3.360
S2+700	797601.180	676421.186	3.269
S2+800	797501.424	676475.145	3.291
S2+900	797401.413	676528.615	3.380
S3+000	797302.357	676582.632	3.495
S3+100	797194.213	676641.161	3.694
S3+200	797104.094	676691.099	3.840
S3+300	797003.332	676748.362	3.924
S3+400	796905.048	676804.618	3.900
S3+500	796798.800	676853.463	3.790
S3+600	796698.515	676911.020	3.910
S3+700	796601.372	676967.162	3.654

ตารางที่ 3 (ต่อ) ตำแหน่งค่าพิกัดหมุดอ้างอิงแนวชายหาดด้านทิศใต้

ชื่อหมุด	ค่าพิกัด		ระดับ (MSL.)
	เหนือ (N)	ตะวันออก (E)	
S3+800	796501.121	677022.257	3.724
S3+900	796396.932	677080.050	3.801
S4+000	796299.904	677132.725	3.822
S4+100	796200.415	677190.209	3.886
S4+200	796097.513	677246.362	3.798
S4+300	795995.439	677303.303	3.829
S4+400	795900.019	677356.461	3.729
S4+500	795817.921	677405.908	3.305
S4+600	795708.053	677468.164	3.211
S4+700	795597.840	677534.815	2.910
S4+800	795499.091	677600.982	2.544
S4+900	795400.232	677668.797	2.796
S5+000	795296.545	677738.652	3.078
S5+100	795196.049	677806.776	2.974
S5+200	795098.422	677874.165	2.989
S5+300	794999.206	677946.740	3.199
S5+400	794895.879	678012.547	3.193
S5+500	794797.874	678077.847	3.038
S5+600	794696.103	678148.054	2.942
S5+700	794600.012	678224.589	3.116
S5+800	794498.248	678284.018	3.308
S5+900	794396.921	678353.338	3.259
S6+000	794300.310	678462.966	2.727
BM03	795238.916	677807.640	2.841
BM04	794209.223	678602.346	2.064

5. งานสำรวจภูมิประเทศและงานสำรวจหยั่งน้ำ

5.1 เครื่องมือและอุปกรณ์การสำรวจ

- กล้อง Total Station พร้อมอุปกรณ์ จำนวน 1 ชุด
- กล้องระดับ พร้อมอุปกรณ์ จำนวน 1 ชุด
- เครื่องหาพิกัดด้วยดาวเทียม จำนวน 2 ชุด
- เครื่องหยั่งน้ำพร้อมอุปกรณ์ จำนวน 1 ชุด
- โปรแกรมสำรวจและคอมพิวเตอร์
- เครื่องวัดระดับน้ำขึ้น-ลง แบบดิจิตอล
- อุปกรณ์งานสนามและอื่นๆ

รายละเอียดเครื่องมือและอุปกรณ์ และโปรแกรมการสำรวจ ดังเอกสารแนบ

5.2 วิธีการขั้นตอนการสำรวจ

1. งานสำรวจเก็บรายละเอียดแนวชายฝั่ง มีขั้นตอนดังนี้

1) ตรวจสอบหมุดหลักฐาน BM.01-BM.02-BM.03 และ BM.04 ใช้ค่าพิกัดหมุดหลักฐานดังกล่าวเป็นพิกัดเริ่มต้น ทำวงรอบตรวจสอบพิกัดทางราบและทางตั้งของหมุดอ้างอิงตามแนวชายหาด เพื่อใช้ในการตั้งกล้องสำหรับเก็บรายละเอียด ตามแนวสำรวจที่กำหนดไว้

2) ตั้งกล้อง ตรงตามหมุดหลักฐานอ้างอิงแนวชายฝั่ง ส่องเก็บรายละเอียดตามแนวสำรวจในแต่ละแนว จากหมุดอ้างอิงลงไปทะเลให้ได้ตำแหน่งที่เรือสำรวจเข้ามาได้ เก็บรายละเอียดบริเวณตามแนวชายฝั่งตามจุดเปลี่ยนของระดับตามแนวสำรวจ จดบันทึกข้อมูลจากกล้องสำรวจให้ได้ค่า มุมราบ ระยะแนวราบ ระยะสูงต่างแนวตั้ง เพื่อนำมาคำนวณหาค่าพิกัดและค่าระดับในตำแหน่งนั้นๆ

3) ทำการสำรวจในบริเวณพื้นที่สำรวจตามแนวชายฝั่งที่กำหนดจนแล้วเสร็จ นำข้อมูลที่ได้ไปประมวลผลเพื่อใช้ในการทำงานขั้นตอนต่อไป แสดงดังภาพที่ 8



ภาพที่ 8 งานสำรวจเก็บรายละเอียดชายฝั่ง

2. งานสำรวจหยั่งน้ำ มีขั้นตอนดังนี้

1) ใช้ระดับน้ำขึ้นน้ำลง ที่สถานีวัดระดับน้ำอัตโนมัติของกรมเจ้าท่า ที่ติดตั้งไว้ที่ท่าเทียบเรือศูนย์ชุด
ลอกบำรุงรักษาร่องน้ำสงขลา และบันทึกน้ำขึ้น-น้ำลงทุก 10 นาที ตลอดระยะเวลาที่สำรวจหยั่งน้ำ เพื่อใช้เป็น
เกณฑ์หักลบกับระดับน้ำที่ยังได้ แสดงดังภาพที่ 9



ภาพที่ 9 เครื่องวัดระดับน้ำอัตโนมัติ

2) ติดตั้ง GPS.BASE STATION ทำการติดตั้ง GPS.BASE STATION ที่หมุดหลักฐาน BM.03 เพื่อส่ง
สัญญาณค่าแก่ด้วย RADIO MODEM ให้กับ GPS.ROVER ที่อยู่บนเรือสำรวจ แสดงดังภาพที่ 10



ภาพที่ 10 การติดตั้ง GPS.BASE STATION

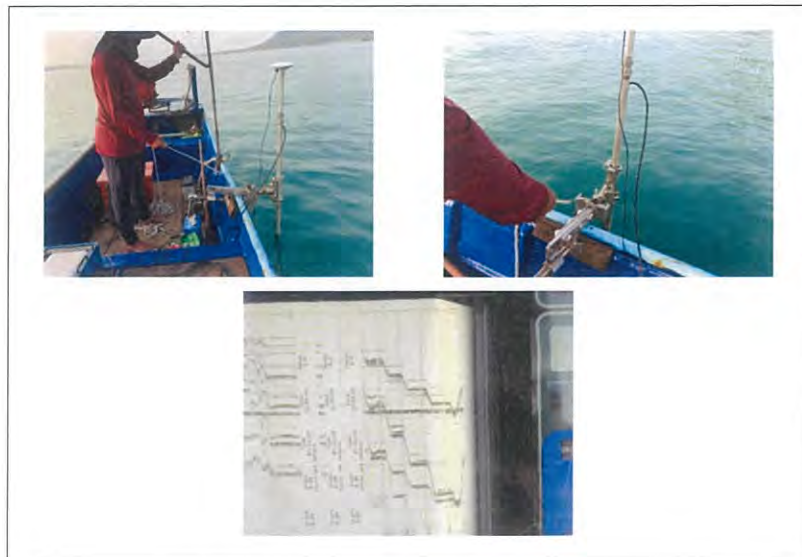
3) ติดตั้งอุปกรณ์สำรวจในเรือสำรวจ

- ติดตั้งหัวรับส่งคลื่นความถี่เสียงใต้น้ำ (Transducer) ไว้ที่บริเวณกานเรือ โดยให้หัวรับส่งคลื่น
ความถี่เสียงใต้น้ำลงไปในน้ำจากผิวหน้า 0.76 เมตร ต่อสายสัญญาณเข้ากับตัวเครื่อง Echo Sounder
- ติดตั้งเสาอากาศเครื่องรับดาวเทียม ให้ตรงกับตำแหน่งที่ติดตั้ง Transducer ของเครื่อง Echo
Sounder เพื่อจะทำให้ค่าพิกัดตรงกันกับตำแหน่งค่าความลึก
- ติดตั้ง Echo Sounder, GPS.Rover และคอมพิวเตอร์โน้ตบุ๊ก ไว้ในเรือ ตั้งเวลาของ Echo
Sounder, GPS และคอมพิวเตอร์โน้ตบุ๊กให้ตรงกัน ต่อสายสัญญาณรับ/ส่งข้อมูลของเครื่อง GPS. และเครื่อง
Echo Sounder เข้ากับคอมพิวเตอร์ ที่ติดตั้งโปรแกรมสำรวจทางอุทกศาสตร์ (Hydro Pro2.3) และทดสอบการ
ทำงานของระบบ ก่อนการสำรวจ แสดงดังภาพที่ 11



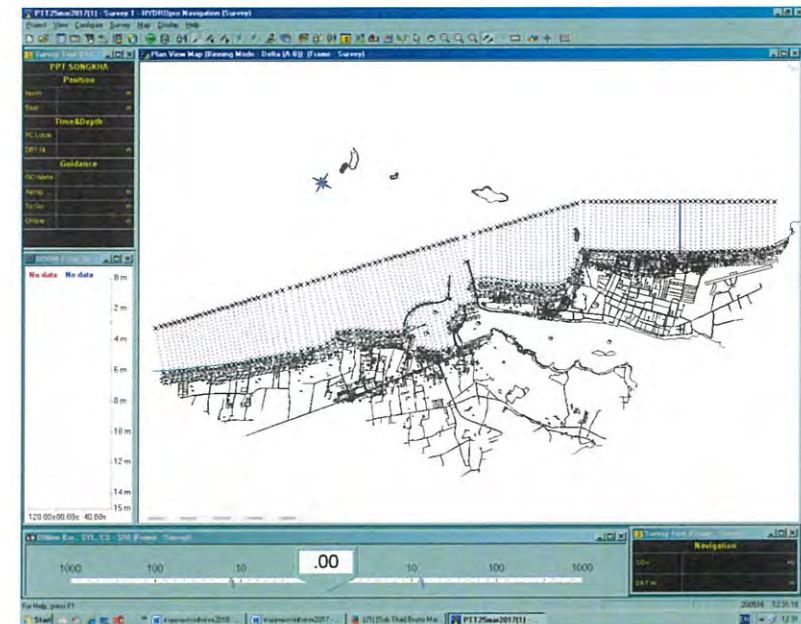
ภาพที่ 11 ติดตั้งอุปกรณ์สำรวจในเรือสำรวจ

4) ทำการตรวจสอบความถูกต้องของค่าความลึกที่ได้จากเครื่องหยั่งน้ำด้วยการทำ Bar Check คือ การนำเอาแผ่นโลหะ (Bar) ที่สะท้อนสัญญาณคลื่นเสียงซึ่งผูกด้วยลวดสลิงมีเครื่องหมายบอกระยะทุก ๆ 1 เมตร หย่อนลงไปใต้น้ำให้แนวดิ่งตรงกับบริเวณที่ติดตั้ง Transducer ของเครื่องหยั่งน้ำ แผ่นโลหะจะสะท้อนสัญญาณเสียงที่ส่งออกไปกลับคืนมายังเครื่องหยั่งน้ำ ทำให้ทราบค่าระดับในระยะที่หย่อนแผ่นลงไป หากเครื่องหยั่งน้ำอ่านค่าความลึกไม่ตรงกับระยะที่แผ่นโลหะ ให้ปรับแต่งเครื่องหยั่งน้ำให้อ่านค่าความลึกให้ตรงกับระยะที่ลวดสลิง ทำการทดสอบทุกๆ ระยะ 1 เมตร จนถึงความลึกที่ข่งน้ำ แสดงดังภาพที่ 12



ภาพที่ 12 ตรวจสอบความถูกต้องของเครื่องหยั่งน้ำ

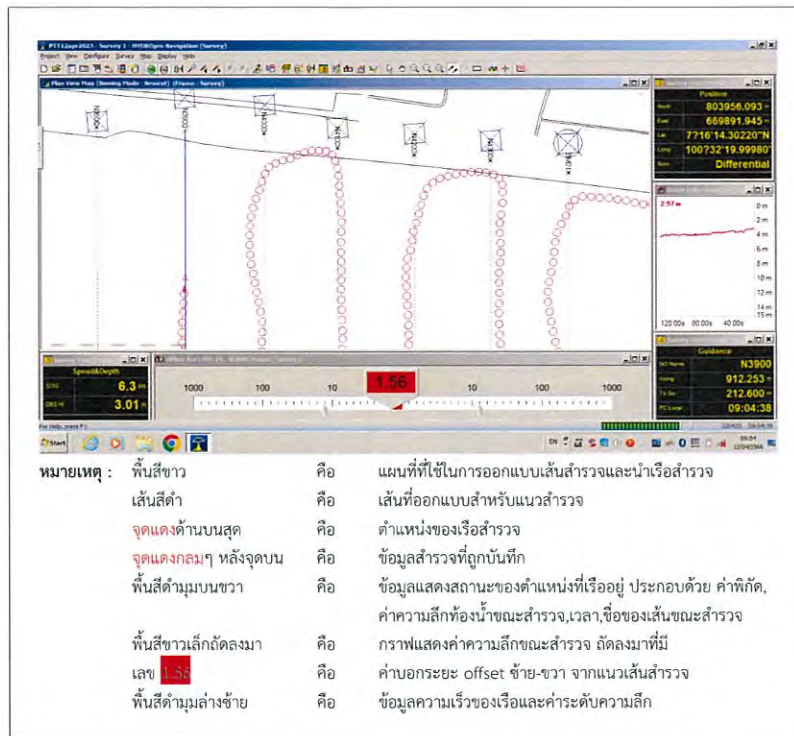
5) หยั่งน้ำและบันทึกข้อมูลออกแบบแนวหยั่งน้ำในพื้นที่สำรวจตามแบบที่กำหนดด้วยการกำหนดค่าพิกัดจุดเริ่มต้น (Start Point) และจุดสิ้นสุด (End Point) ของแต่ละแนวตามพิกัดอ้างอิงตามแนวชายฝั่งทะเลที่สร้างไว้ โดยใช้โปรแกรมสำรวจทางอุทกศาสตร์ โดยกำหนดแนวสำรวจทุกๆ 100 เมตร ตามแนวเส้นตัดขวางตลอดระยะทาง 10 กิโลเมตร ตามแนวชายฝั่ง แสดงดังรูปที่ 4



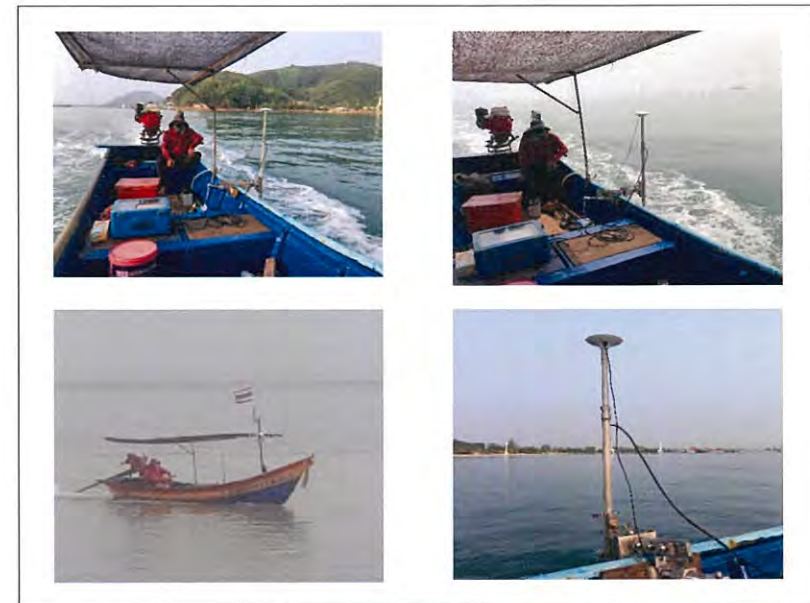
หมายเหตุ : เส้นสีน้ำเงินคือเส้นที่ออกแบบสำหรับนำเรือสำรวจ

รูปที่ 4 การออกแบบเส้นแนวสำรวจเก็บข้อมูล

6) สำรวจและบันทึกข้อมูล โดยการควบคุมเรือสำรวจให้อยู่ในแนวสำรวจที่ออกแบบไว้ รับข้อมูลค่าพิกัดเรือสำรวจจากเครื่อง GPS ซึ่งจะมีการ Update ข้อมูลทุก 1 วินาที โปรแกรมสำรวจจะแจ้งทิศทางและตำบลที่เรือให้ผู้ควบคุมเรือทราบจากจอคอมพิวเตอร์ ซึ่งจะทำให้ผู้ควบคุมเรือสามารถควบคุมเรือให้อยู่ในแนวสำรวจที่ออกแบบไว้ได้ตลอดเวลา สำรวจบันทึกข้อมูลในแต่ละแนวสำรวจ โดยโปรแกรมสำรวจจะบันทึกข้อมูลของเวลาตำบลที่ และความรู้สึกของน้ำในแต่ละแนว โดยจะเก็บข้อมูลต่อเนื่องตลอดแนวในขณะที่ทำการสำรวจ ทำการสำรวจยังตามที่ยกแบบไว้ทุกแนวจนแล้วเสร็จ แสดงดังรูปที่ 5 และภาพที่ 13



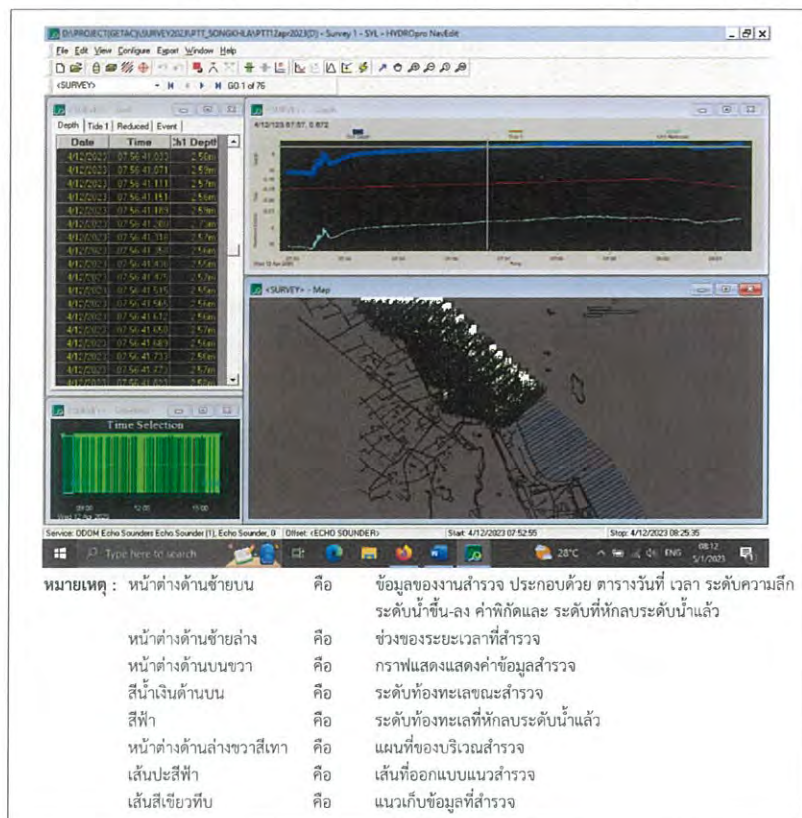
รูปที่ 5 การเก็บข้อมูลของโปรแกรมสำรวจ



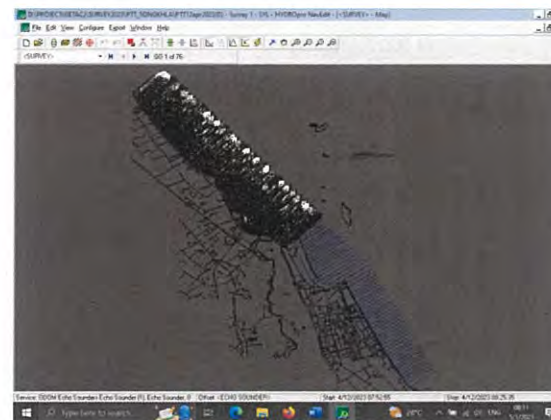
ภาพที่ 13 การสำรวจที่ยกน้ำเก็บข้อมูลตามแนวสำรวจ

3. ประมวลผลและจัดทำแบบแผนที่-รูปตัด

1) ประมวลผล นำข้อมูลสำรวจที่บันทึกไว้มาตรวจสอบความถูกต้องของข้อมูลด้วยโปรแกรมการสำรวจโดยเรียกดูข้อมูลที่ถูกบันทึกไว้ในแต่ละแนวสำรวจ ตรวจสอบและเปรียบเทียบกับกระดานกราฟที่พล็อตจากเครื่องหยังนำว่ามีข้อมูลที่แก้ไขข้อมูลที่แท้จริงจากการสำรวจหรือไม่ เช่น ข้อมูลความลึกที่ลึกหรือตื้นผิดปกติหรือลึกเกินปกติซึ่งจะถูกคัดออกไป นำข้อมูลผ่านการตรวจสอบแล้วมาห้กลับกับค่าระดับน้ำขึ้น-ลงที่ได้จากการบันทึกของเครื่องวัดระดับน้ำติดจอตล ซึ่งกำหนดบันทึกทุกๆ 10 นาที อ้างอิงค่าระดับน้ำจากกระดานเลปานกลางโดยการป้อนข้อมูลค่าระดับน้ำขึ้น-ลง ตามวันที่และเวลาที่ทำการสำรวจ โปรแกรมจะคำนวณและห้กลับค่าความลึกระดับน้ำโดยอัตโนมัติ นำข้อมูลที่ห้กลับระดับน้ำแล้วไปใช้ในการทำงานต่อไป แสดงดังรูปที่ 6 และรูปที่ 7

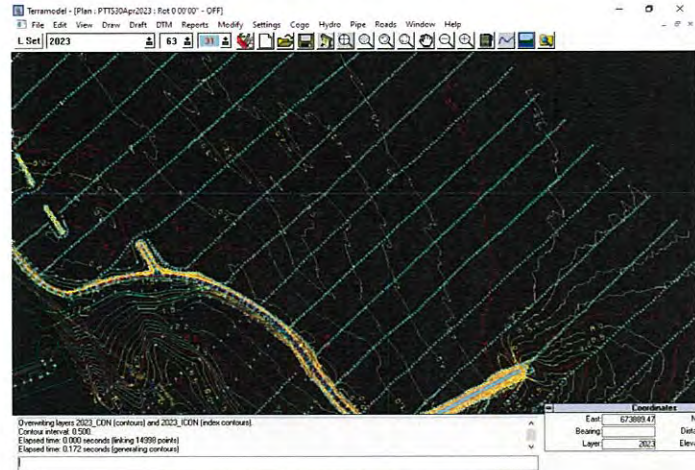


รูปที่ 6 การตรวจสอบข้อมูลสำรวจ

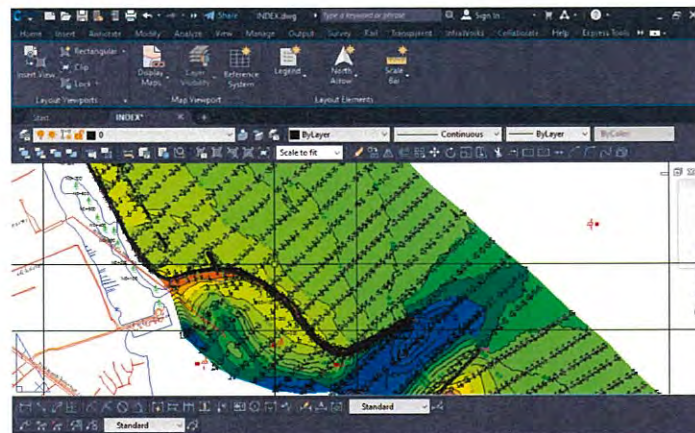


รูปที่ 7 แผนที่ของบริเวณสำรวจ

2) งานสร้างแผนที่และเส้นระดับความสูง (Contour) นำข้อมูลที่ได้จากการสำรวจ (Points) มาทำเป็นเลขแสดงระดับท้องน้ำ พร้อมกำหนดเส้นแสดงค่าระดับ (Contour) ซึ่งจะกำหนดไว้ทุกๆ 1.00 เมตร แสดงดังรูปที่ 8 และรูปที่ 9

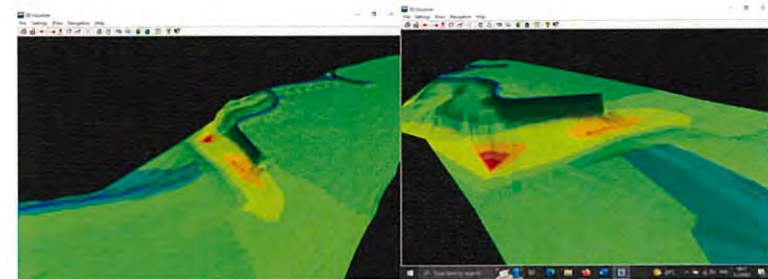


รูปที่ 8 การสร้างเลขระดับน้ำและเส้นชั้นความสูงจากโปรแกรมสำรวจ

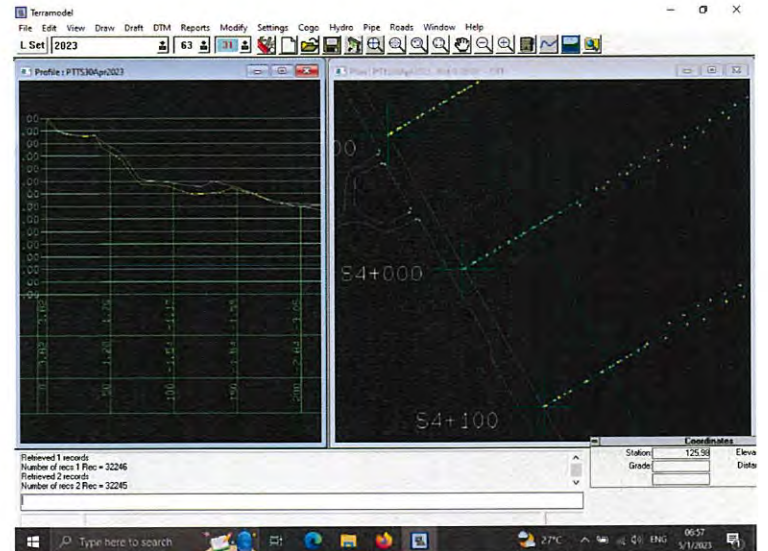


รูปที่ 9 การสร้างเลขระดับน้ำจากโปรแกรมสำรวจ

3) การทำรูปตัดแนวชายหาด จากข้อมูลที่ได้จากการสำรวจ (Points) นำมาสร้างพื้นผิว (Surface หรือ DTM) ซึ่งคุณลักษณะของ Points จะประกอบด้วย ค่า X,Y และ Z ดังนั้น โปรแกรมก็สามารถรวม Points และสร้างเป็นพื้นผิวขึ้นมา สร้างเส้นแนวตัด (Alignments) ในตำแหน่งที่ต้องการการทำรูปตัดแนวชายหาด ใส่พิกัดจุดเริ่มต้นและพิกัดจุดสิ้นสุดของเส้นแนวตัด ในตำแหน่งและระยะที่ต้องการ คำนวณและพล็อตรูปตัดจากคำสั่งในโปรแกรมสำรวจ โปรแกรมจะคำนวณและสร้างรูปตัดขึ้นมา แสดงดังรูปที่ 10 และรูปที่ 11



รูปที่ 10 พื้นผิวจำลองบริเวณสำรวจ



รูปที่ 11 โปรแกรมสำรวจ การสร้างรูปตัดแนวชายหาด

5.3 ผลการสำรวจ

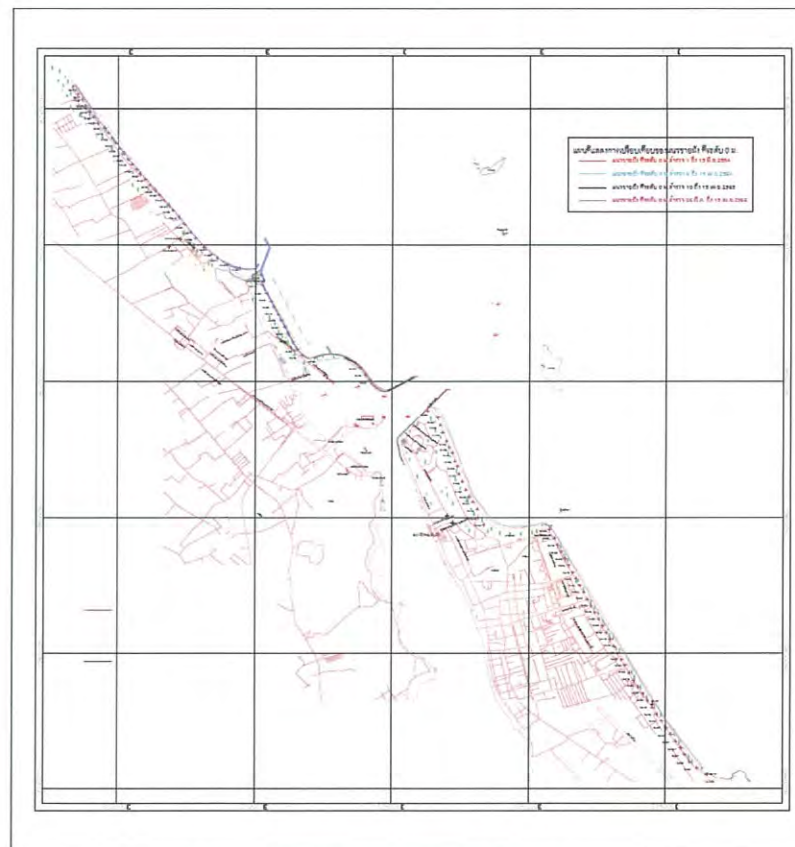
นำเอารูปตัดที่สำรวจในปี 2565 มาวางซ้อนทับรูปตัดที่สำรวจในปี 2566 เปรียบเทียบหาความแตกต่างของพื้นที่ท้องน้ำ แสดงแผนที่เปรียบเทียบของแนวชายฝั่งที่สำรวจ ที่ระดับ 0 เมตร และแผนที่ระดับความลึกท้องน้ำบริเวณที่สำรวจ ดังรูปที่ 12 และ 13 ตามลำดับ และสามารถสรุปผลได้ดังนี้

1) บริเวณแนวชายหาดด้านทิศเหนือ

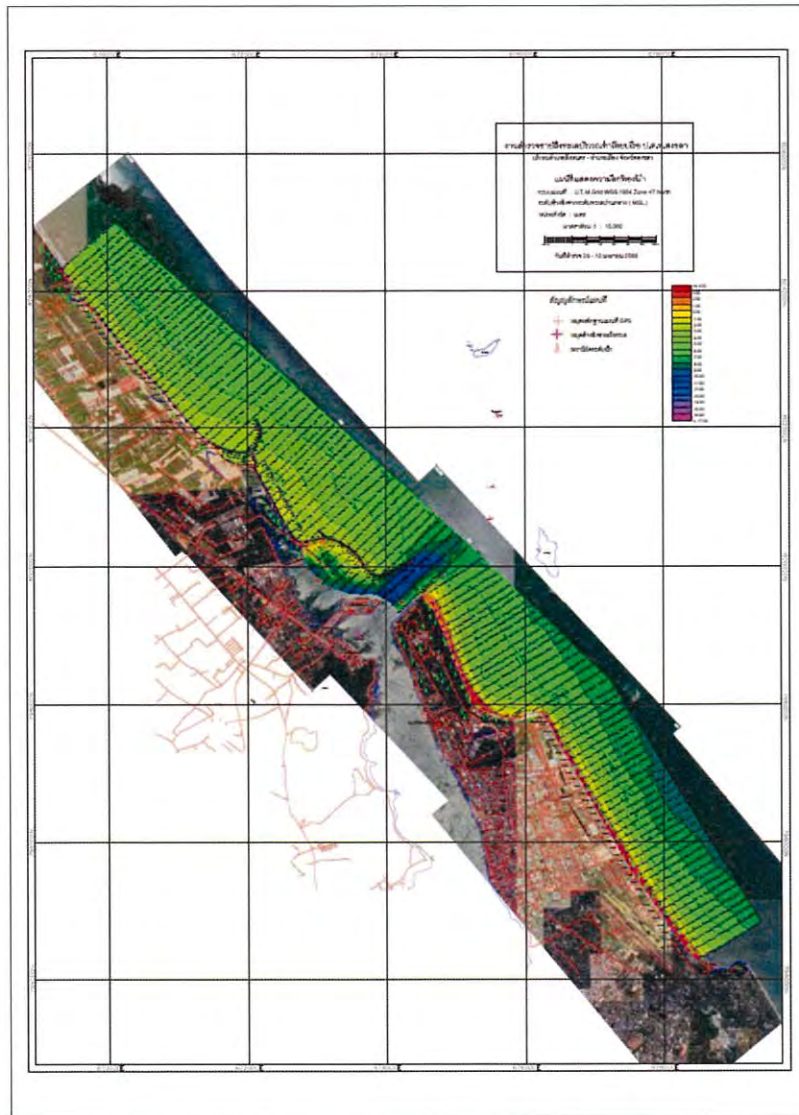
บริเวณตั้งแต่ BM.02 ถึง N3+900 เปรียบเทียบกับปี 2565 สภาพพื้นที่มีการจากหมุดอ้างอิงออกไป สภาพพื้นที่มีการกัดเซาะของชายฝั่งเข้ามาประมาณ 20 เมตร ค่าระดับลดลงประมาณ 1.00-1.50 เมตร ระยะจาก 20 เมตรออกไปจนสุดแนวสำรวจ สภาพพื้นที่มีการทับถมของตะกอนเพิ่มขึ้น ค่าระดับเพิ่มขึ้นประมาณ 30-50 เซนติเมตร ความลาดเอียงของท้องทะเล จากเส้น Contour ที่ระดับ 2.50 เมตร ออกไปถึงระยะที่ 400 เมตร มีความลาดเอียงประมาณ 1 ต่อ 250 (ทางตั้งต่อทางราบ) จากระยะที่ 400 เมตร ออกไปมีความลาดเอียงประมาณ 1 ต่อ 410 (ทางตั้งต่อทางราบ) แสดงดังภาพที่ 14



ภาพที่ 14 สภาพชายหาดช่วง BM02 ถึง N3+800



รูปที่ 12 แผนที่เปรียบเทียบของแนวชายฝั่งที่สำรวจ ที่ระดับ 0 เมตร



รูปที่ 13 แผนที่ระดับความลึกท้องน้ำบริเวณที่สำรวจ

บริเวณตั้งแต่ N3+800 ถึง N2+900 เปรียบเทียบกับปี 2565 สภาพพื้นที่บริเวณหมู่ตออ่างอิงมีการทับถมของตะกอนเพิ่มขึ้นเฉลี่ยประมาณ 60-80 ซม. จากหมู่ตออ่างอิงออกไปจนสุดแนวสำรวจ มีการทับถมของตะกอนเพิ่มขึ้นเฉลี่ยประมาณ 20-30 ซม. ความลาดเอียงของท้องทะเล จากเส้น Contour ที่ระดับ 2.50 เมตร ออกไปถึงระยะที่ 400 เมตร มีความลาดเอียงประมาณ 1 ต่อ 250 (ทางตั้งต่อทางราบ) จากระยะที่ 460 เมตร ออกไปมีความลาดเอียงประมาณ 1 ต่อ 420 (ทางตั้งต่อทางราบ)

บริเวณตั้งแต่ N2+900 ถึง N1+500 เปรียบเทียบกับปี 2565 สภาพพื้นที่เป็นเขื่อนกันตลิ่งพังแบบ ค.ส.ล. ยังคงมีความสมบูรณ์ จากหมู่ตออ่างอิงออกไปจนสุดแนวสำรวจ มีการทับถมของตะกอนเพิ่มขึ้นเฉลี่ยประมาณ 20-30 เซนติเมตรจากเส้น Contour ที่ระดับ 2.50 เมตร ออกไปถึงระยะที่ 500 เมตร มีความลาดเอียงประมาณ 1 ต่อ 310 (ทางตั้งต่อทางราบ) จากระยะที่ 500 เมตร ออกไปสุดแนวสำรวจมีความลาดเอียงประมาณ 1 ต่อ 450 แสดงดังภาพที่ 15



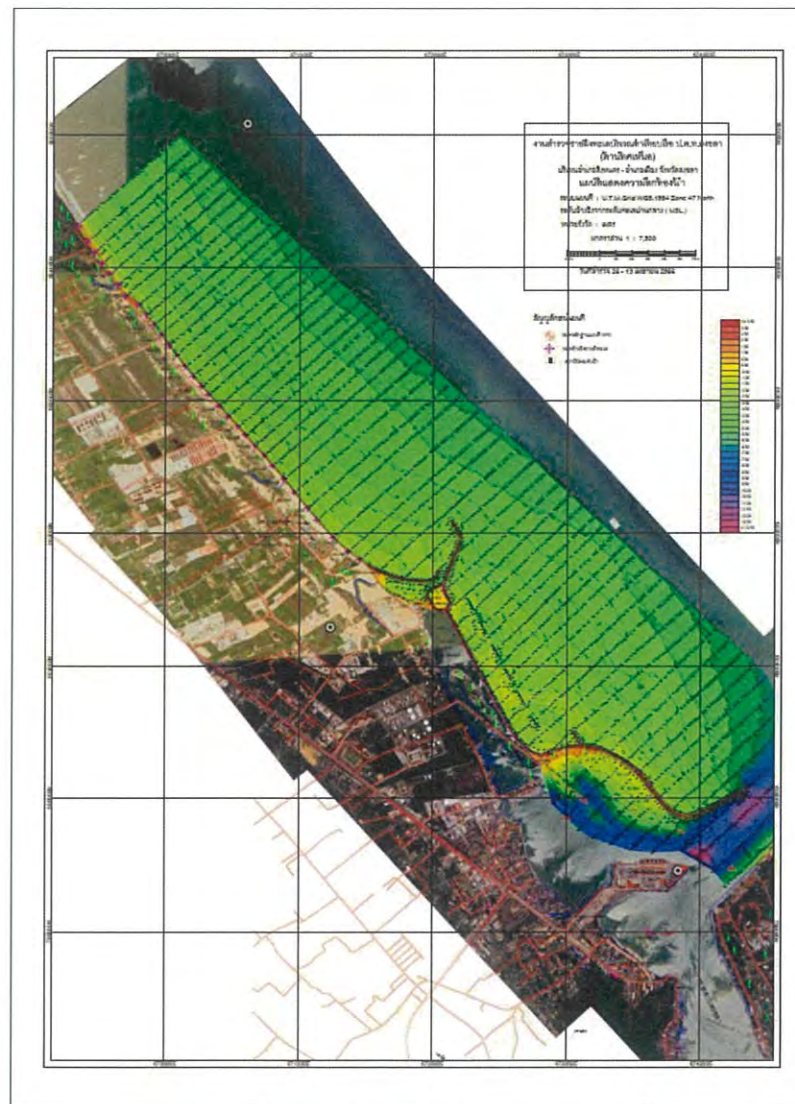
ภาพที่ 15 สภาพชายหาดช่วง N2+900 ถึง N1+500

บริเวณตั้งแต่ N1+400 ถึง N1+300 เปรียบเทียบกับปี 2562 สภาพพื้นที่มีการจากหมุดอ้างอิงออกไปจนสุดแนวสำรวจ สภาพพื้นที่มีค่าระดับเพิ่มขึ้นมีการทับถมของตะกอนเพิ่มขึ้นเฉลี่ยประมาณ 20-30 เซนติเมตร ความลาดเอียงของท้องทะเลประมาณ 1 ต่อ 480

บริเวณตั้งแต่ N1+200 ถึง N0+000 บริเวณตั้งแต่ธรรมชาติทรุดทรอยทั่ว เมื่อเปรียบเทียบกับปี 2565 บริเวณหมุดอ้างอิง สภาพพื้นที่เป็นเขื่อนกันคลื่นจากหมุดอ้างอิงออกไปที่ระยะ 150 เมตร มีการทับถมของตะกอนเพิ่มขึ้นเฉลี่ยประมาณ 20-30 ซม. จากระยะที่ 150 เมตร ออกไป สภาพพื้นที่มีการเปลี่ยนแปลงเพิ่มขึ้น-ลดลงของตะกอนเล็กน้อย ความลาดเอียงของท้องทะเลมีความลาดเอียงประมาณ 1 ต่อ 400 (ทางตั้งต่อทางราบ) แสดงดังภาพที่ 16 และแสดงแผนที่ความลึกของท้องน้ำบริเวณแนวชายหาดทางด้านทิศเหนือ ดังรูปที่ 14



ภาพที่ 16 สภาพชายหาดช่วง N1+200, N0+000



รูปที่ 14 แผนที่ความลึกของท้องน้ำบริเวณแนวชายหาดทางด้านทิศเหนือ

2) บริเวณแนวชายหาดด้านทิศใต้

แนวสำรวจที่ S0+100, S0+200, S0+300 เมื่อเปรียบเทียบรูปตัดกับปี 2565 ค่าระดับมีการเปลี่ยนแปลงเล็กน้อย มีการทับถมของตะกอนเพิ่มขึ้นประมาณ 10-15 เซนติเมตร ความลาดเอียงของท้องทะเลมีความลาดเอียงประมาณ 1 ต่อ 380 (ทางตั้งต่อทางราบ)

บริเวณตั้งแต่ S0+800 ถึง S1+600 เมื่อเปรียบเทียบรูปตัดกับปี 2565 บริเวณตั้งแต่หมู่ตออ่างอิงออกไปประมาณ 100 เมตร มีการทับถมของทรายเพิ่มขึ้นประมาณ 70-90 ซม.จากระยะที่ 100 เมตร ออกไปจนสุดแนวสำรวจมีการทับถมของตะกอนเพิ่มขึ้นประมาณ 30-40 เซนติเมตร ความลาดชันของท้องทะเลมีความลาดเอียงประมาณ 1 ต่อ 370 (ทางตั้งต่อทางราบ)

บริเวณตั้งแต่ S1+600 ถึง S2+400 เมื่อเปรียบเทียบรูปตัดกับปี 2565 สภาพพื้นที่มีตั้งแต่หมู่ตออ่างอิงออกไปประมาณ 200 เมตร มีการทับถมของทรายเพิ่มขึ้นประมาณ 60-80 เซนติเมตรจากระยะที่ 300 เมตร ออกไปจนสุดแนวสำรวจมีการทับถมของตะกอนเพิ่มขึ้นประมาณ 20-30 เซนติเมตร ความลาดเอียงของท้องทะเลมีความลาดเอียงประมาณ 1 ต่อ 400 (ทางตั้งต่อทางราบ) แสดงสภาพชายหาดช่วง S0+800, S2+400 ดังภาพที่

17



ภาพที่ 17 สภาพชายหาดช่วง S0+800, S2+400

บริเวณตั้งแต่ S2+500 ถึง S4+700 เปรียบเทียบกับปี 2565 สภาพพื้นที่จากหมู่ตออ่างอิงออกไปประมาณ 300 เมตร มีการทับถมของตะกอนเพิ่มขึ้นเฉลี่ยประมาณ 10-20 ซม. จากระยะที่ 300 เมตร ออกไปจนสุดแนวสำรวจมีการทับถมของตะกอนเพิ่มขึ้นและลดลงเล็กน้อย ความลาดเอียงของท้องทะเลมีความลาดเอียงประมาณ 1 ต่อ 380 (ทางตั้งต่อทางราบ)

บริเวณตั้งแต่ S4+700 ถึง S5+200 เมื่อเปรียบเทียบรูปตัดกับปี 2565 บริเวณตั้งแต่หมู่ตออ่างอิงออกไปประมาณ 400 เมตร มีค่าระดับเพิ่มขึ้นเฉลี่ยประมาณ 15-25 ซม. จากระยะที่ 400 เมตร ออกไปจนสุดแนวสำรวจค่าระดับเพิ่มขึ้นเล็กน้อย ความลาดเอียงของท้องทะเลประมาณ 1 ต่อ 390 (ทางตั้งต่อทางราบ)

บริเวณตั้งแต่ S5+200 ถึง S6+000 เมื่อเปรียบเทียบรูปตัดกับปี 2565 บริเวณตั้งแต่หมู่ตออ่างอิงออกไปประมาณ 80 เมตร มีค่าระดับเพิ่มขึ้นเฉลี่ยประมาณ 15-25 เมตร จากระยะที่ 80 เมตร ออกไปจนสุดแนวสำรวจ ค่าระดับเพิ่มขึ้นและลดลงเล็กน้อย ความลาดเอียงของท้องทะเลประมาณ 1 ต่อ 390 (ทางตั้งต่อทางราบ) และแสดงแผนที่ความลึกของท้องน้ำบริเวณแนวชายหาดทางด้านทิศใต้ ดังรูปที่ 15

จัดทำโดย บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด

เครื่องมือและอุปกรณ์ และโปรแกรมการสำรวจ

รายละเอียดคุณลักษณะของเครื่องมือสำรวจ และโปรแกรมสำรวจ

1. GPS.

KEY FEATURES

Industry-leading technology provides superior performance

Flexible configurations put you in total control

Rugged, high-performance hardware is built to last

With the Trimble controller and software of your choice, enjoy seamless integrated surveying



ONE RECEIVER, MANY CONFIGURATIONS, FOR GREATER FLEXIBILITY AND CHOICE

The Trimble® 5700 GPS receiver is an advanced, but easy-to-use, surveying instrument that is rugged and versatile enough for any job.

Combine your 5700 with the antenna and radio that best suit your needs, and then add the Trimble controller and software of your choice for a total surveying solution. The powerful 5700 GPS system will provide all the advanced technological power and unparalleled flexibility you need to increase your efficiency and productivity in any surveying environment.

ADVANCED GPS RECEIVER TECHNOLOGY

The 5700 is a 24-channel dual-frequency RTK GPS receiver featuring the advanced Trimble Maxwell™ technology for superior tracking of GPS satellites, increased measuring speed, longer battery life through less power use, and optimal precision in tough environments. WAAS and EGNOS capability lets you perform real-time differential surveys to GIS grade without a base station.

MODULAR DESIGN FOR VERSATILITY

For topographic, boundary, or engineering surveying, clip the receiver to your belt, carry it in a comfortable backpack, or configure it with all components on a lightweight range pole. With the receiver attached to your site vehicle, you can survey a surface as fast as you can drive! For control applications, attach the receiver to a tripod — it's designed to work the way your job requires.

FULL METAL JACKET ... AND LIGHTWEIGHT

The 5700 GPS receiver boasts the toughest mechanical and waterproofing specs in the business. Its magnesium alloy case is stronger than aluminum, but also 30% lighter—the 5700 weighs just 1.4 kg (3 lb) with batteries. Whether you're collecting control points on a tripod, or scrambling down a steep slope collecting real-time kinematic data, the receiver is light enough and tough enough to carry on performing.

FAST AND EFFICIENT DATA STORAGE AND COMMUNICATIONS

Use the receiver's CompactFlash memory to store more than 3,400 hours of continuous L1/L2 data collection at an average of 15-second intervals. Transfer data to a PC at speeds of more than 1 megabit per second through the super-fast USB port. Your choice of UHF radio modem is built in to the receiver to provide RTK communications receiving without the need for cables or extra power!

YOUR CHOICE OF TRIMBLE ANTENNA

Choose the high-accuracy Trimble GPS antenna that best suits your needs: the lightweight and portable Zephyr™ antenna for RTK roving, or the Zephyr Geodetic™ antenna for geodetic surveying.

The Zephyr Geodetic antenna offers submillimeter phase center repeatability and excellent low-elevation tracking, while the innovative design of its Trimble Stealth™ ground plane literally burns up multipath energy using technology similar to that used by stealth aircraft to hide from radar. The Zephyr Geodetic antenna thus provides unsurpassed accuracy from a portable antenna.



General

- Front panel for on/off, one-button push data logging, CompactFlash card formatting, ephemeris and application file deletion, and restoring default controls.
- LED indicators for satellite tracking, radio-link, data logging, and power monitoring
- Tripod clip or integrated base case

PERFORMANCE SPECIFICATIONS

Measurements

- Advanced Trimble Maxwell technology
- High precision multiple correlator L1 and L2 pseudorange measurements
- Unfiltered, unsmoothed pseudorange measurement data for low noise, low multipath error, low time domain correlation, and high dynamic response
- Very low noise L1 and L2 carrier phase measurements with <1 mm precision at a 1 Hz bandwidth
- L1 and L2 Signal-to-Noise ratios reported in dB-Hz
- Proven Trimble low-elevation tracking technology
- 24 Channels L1 C/A Code, L1/L2 Full Cycle Carrier, WAAS/EGNOS

Code differential GPS positioning¹

- Horizontal: ±(0.25 m + 1 ppm) RMS
- Vertical: ±(0.5 m + 1 ppm) RMS
- WAAS differential positioning accuracy typically <5 m 3DRMS²

Static and FastStatic GPS surveying¹

- Horizontal: ±5 mm + 0.5 ppm RMS
- Vertical: ±5 mm + 1 ppm (± baseline length) RMS

Kinematic surveying¹

- Real time and postprocessed kinematic surveys
- Horizontal: ±(10 mm + 1 ppm) (± baseline length) RMS
- Vertical: ±(20 mm + 1 ppm) RMS
- Initialization time: Single/Multi base minimum 10 sec + 0.5 times baseline length in km, up to 30 km
- Scalable GPS infrastructure initialization time: <30 seconds typical anywhere within coverage area
- Initialization reliability³: Typically >99.9%

HARDWARE

5700 GPS receiver

- Physical:
 - Case: Tough, lightweight, fully sealed magnesium alloy
 - Water/dustproof: IP67 Dustproof, protected from temporary immersion to depth of 1 m (3.28 ft)
 - Shock and vibration: Tested and meets the following environmental standards:
 - Shock: MIL-STD-810F to survive a 1 m (3.28 ft) drop onto concrete
 - Vibration: MIL-STD-810-F on each axis
 - Weight: With internal batteries, internal radio, internal battery charger, standard UHF antenna: 1.4 kg (3 lb) As entire RTK rover with batteries for greater than 7 hours, less than 4 kg (8.8 lb)
 - Dimensions (W/H/L): 13.5 cm × 8.5 cm × 24 cm (5.3 in × 3.4 in × 9.5 in)
- Electrical:
 - Power: DC input 11 V DC to 28 V DC with over voltage protection
 - Power consumption: 2.5 W receiver only, 3.75 W including internal radio
 - Battery: Greater than 10 hours data logging, or greater than 7 hours of RTK operation on two internal 2.0 Ah lithium-ion batteries
 - Battery weight: 0.1 kg (3.5 oz)

- Battery charger: Internal with external AC power adapter; no requirement for external charger
- Power output: 11.5 V to 20 V DC (Port 1), 11.5 V DC to 27.5 V DC (Port 3) on external power input
- Certification: Class B Part 15 FCC certification, CE Mark approved, C-Tick approved, Canadian ICCC

Environmental

- Operating temperature⁴: -40 °C to 65 °C (-40 °F to 149 °F)
- Storage temperature: -40 °C to 80 °C (-40 °F to 176 °F)
- Humidity: 100%, condensing

Communications and data storage:

- 2 external power ports, 2 internal battery ports, 3 RS232 serial ports
- Integrated USB for data download speeds in excess of 1 Mb per second
- External GPS antenna connector
- CompactFlash advanced lightweight and compact removable data storage. Options of 64 MB or 128 MB from Trimble
- More than 3,400 hours continuous L1+L2 logging at 15 seconds with 6 satellites typical with 128 MB card
- Fully integrated, fully sealed external UHF radio modem option
- GSM, cellphone, and CDPD modem support
- Dual event marker input capability
- 1 Hz, 2 Hz, 5 Hz, and 10 Hz positioning and data logging
- 1 pulse per second output capability
- CMRR, CMR, RTCM 2- and 3- input and output standard
- 15 NMEA outputs

Zephyr antenna

- Dimensions: 16.2 cm × 6.2 cm diameter height (6.38 in × 2.44 in)
- Weight: 0.55 kg (1.20 lb)
- Operating temperature: -40 °C to 70 °C (-40 °F to 158 °F)
- Humidity: 100% humidity proof, fully sealed
- Shock and vibration: Tested and meets the following environmental standards:
 - Shock: MIL-STD-810-F to survive a 2 m (6.56 ft) drop onto concrete
 - Vibration: MIL-STD-810-F on each axis
- 4 point antenna feed for submillimeter phase center repeatability
- Integral low noise amplifier
- 50 dB antenna gain

Zephyr Geodetic antenna

- Dimensions: 34.3 cm (13.5 in) diameter × 7.6 cm (3 in) height
- Weight: 1.31 kg (2.88 lb)
- Operating temperature: -40 °C to 70 °C (-40 °F to 158 °F)
- Humidity: 100% humidity proof, fully sealed
- Shock and vibration: Tested and meets the following environmental standards:
 - Shock: MIL-STD-810-F to survive a 2 m (6.56 ft) drop onto concrete
 - Vibration: MIL-STD-810-F on each axis
- 4 point antenna feed for submillimeter phase center repeatability
- Integral low noise amplifier
- 50 dB antenna gain
- Trimble Stealth ground plane for reduced multipath

¹ Accuracy may be subject to conditions such as multipath, obstructions, satellite geometry, and atmospheric parameters. Always follow recommended survey practices.
² Expressed as WAAS/EGNOS system performance.
³ May be affected by atmospheric conditions, signal multipath, and satellite geometry.
⁴ Receiver operates normally to -40 °C (-40 °F) but some critical functions such as USB download or internal battery charging are not recommended at temperatures below freezing.



Specifications subject to change without notice.

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 Nederlandse Organisatie voor Wetenschappelijk Onderzoek

Hydrotac II

Precise Data Collection in Adverse Conditions

The image shows a black, ruggedized portable ultrasonic flaw detector, the Hydralux II. It features a large monochrome screen on the left displaying a waveform. To the right of the screen is a control panel with a digital display, several buttons, and a rotary knob. The device has a carrying handle on top and is designed for field use.



Frequency/Agile	Open-selectable through menu - 24,28,33,40,100,120,200,210 and 340 MHz	
Output Power	600watts	
Power-Intelligent ant.	11.58 VDC	
Resolution	0.1 ft./0.01m	
Accuracy	200 Mhz - 1m 0.1% c/dolph value (framed forward velocity) 33 Mhz - 10m 0.1% c/dolph value (framed forward velocity)	
Maximum Depth Range	600m or 1800 ft.	
Operating envial.	Operating 0° -45°C Storage -20° -45°C	
Chirp resolution	2 RSC32 processor RSC32 and 1 R9422 Ethernet port	8 bit data 1600 samples/pt
Processor	High resolution 8 bit/dm 003 c/dp, 16 g/s/shoots, 216mm 0.5 in/wide thermal paper	
Din resolution	Internal ON/OFF w/ich, paper/condensor control	
Weight	368 mm 0.45 in/H x 419 mm 0.65 in/W x 203 mm 8 in/D	
Display Panel Layout	22.5 lbs 102 kgj	
	4 Line x 20 character display OFF/ON/LOW MBD/AC/Power savings Chart/ON/Off w/ich LED inside Chart/Chart Sensitivity	Chart Read Separate panel overlay for display and chart controls Keypad (lower keys) Power Gain
Sensor I/O	GPS Analogous chart Rtk/differential position in Ethernet packet	NRU Have connected data Outputs NRU data in Ethernet packet
Software	Full HW keyboard software included w/Chart Display/Controls & logging software	
Options	200 Mhz/340 Mhz/steering transducer W/ich selection of transducers Remote display LED w/ich Transducer w/ich wheels Internal GPS w/ich WAAS differential correction and RRS reference signal Antenna upgrade	

The Hydropro logo is a blue compass rose with the word "HYDROpro" in black text. Below the logo are three images: a large offshore supply ship, a red and white offshore platform, and a wellhead. To the right of the wellhead image is a small table with two columns and two rows of data.



Applications

- Port and harbor surveys and maintenance
- General hydrographic surveys
- Environmental surveys
- Cable and pipe maintenance surveys
- Moving buoy installation
- Industrial marine applications

Features

HYDROpro Navigation software

- Operates on Windows operating systems for simple point and click operation
- Fully configurable geospatial database with many pre-defined ellipsoids and coordinate systems
- Coordinate Calculator for points and lines
- Built in site calibration and adjustment
- Graphical vessel shape editor
- Automatic switching to backup (secondary) position and altitude sensors
- Powerful multiple 'storey' locally and vessel to vessel guidance
- Multiple vessels and guidance objects (targets, mines, routes)
- Interactive, real-time Plan View Map with rotation including Line Up
- DIF and raster image background display files supported
- Configurable survey test displays (data from Data Tree)
- Log of operator's notes and system alarms
- Multiple sensor inputs (limited by hardware only)
- Heave and tide data from RIK
- Real-time depth profile and channel cross section display
- User-defined echosounder annotation
- Navigation data output to multibeam systems
- Project information and survey data all stored in a single Microsoft Access database file
- Heading from dual positioning devices
- Fully configurable equipment timing (latency, pulse-per-second, 'timeouts')
- Time stamping to 1-millisecond precision
- Output of data to printer, file, or serial ports in real-time
- On-line help and training

HYDROpro NavEdit software (included)

- Position, depth, heave, and tide editing by interactive graphics or batch processing
- Graphical displays show both the raw and composite data on same screen



- Sounding Selection to reduce processed data volume
- User-definable ASCII format and proprietary data files for postprocessing (import and export)

Teramodul HDMS software (optional)

- Raped contouring, plotting, cross sections, and volumes

Technical Specifications

Minimum Configuration

Processor	Pentium III 300 Mhz
RAM	128 MB
Hard drive	4 GB
Monitor	SVGA color 1024 x 768
Data devices	CD-ROM drive
Operating system	Windows NT, 2000, or XP Professional

Options

Components such as radio telemetry can be ordered through Trimble.

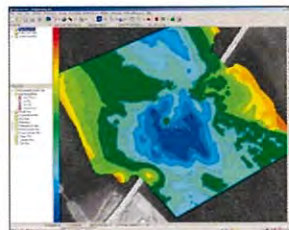
- Fax box for tagging and moving events
- Training

Ordering Information

HYDROpro Navigation software is available standard with quick reference guide, security key, and software manuals on CD.	
HYDROpro Navigation	Part Number 44292-00
HYDROpro Construction upgrade	Part Number 44298-00
Teramodul HDMS	Part Number 44280-00
Teramodul Channel Design	Part Number 45164-00
Teramodul Visualizer	Part Number 44281-00

For further information contact your local Trimble office or representative.
 You may also visit our website at <http://www.trimble.com>.

Specifications subject to change without notice.



HYPACK® is a Windows™-based software package used primarily for hydrographic surveying and data processing.

It is optimized to run under:

- Windows 2000™
- Windows XP™

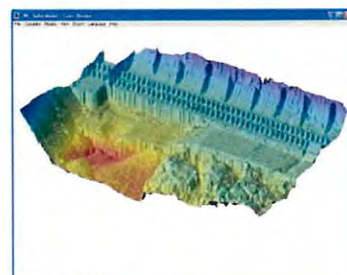
HYPACK® performs all of the tasks necessary to complete your survey from beginning to end.

- Geodetic Parameters
- Planned Line Design
- Equipment Configuration
- Data Collection supporting over 200 sensors
- Data Processing
- Tides and Sound Velocity
- Sounding Reduction
- Export to DXF/DGN
- Plotting of Smooth Sheets
- Volumes by Section
- Volumes by Surface Model
- Contouring to DXF
- 3D Visualization
- Side Scan Collection and Processing
- ACDP Collection and Display

The optional HYSWEEP® module allows for the configuration, calibration, collection and processing of multibeam and multiple transducer sonar systems.

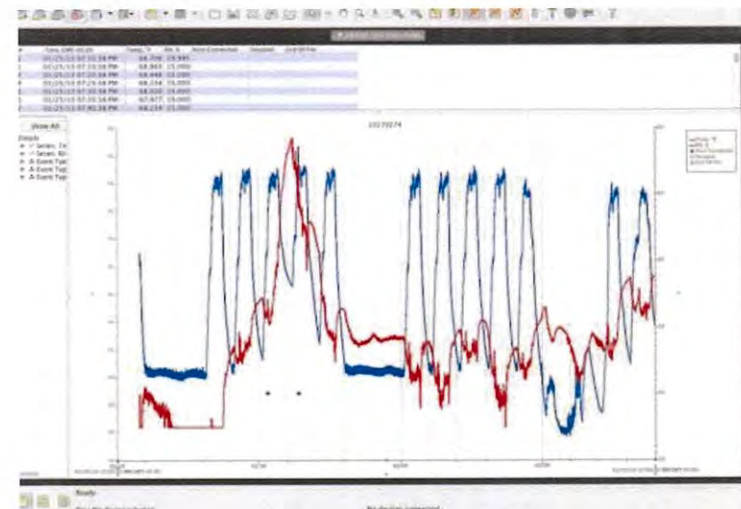
The DREDGEPAK® version allows you to maximize the efficiency of your dredge operations by tracking and maintaining a history of where the cutting tool has passed and how deep it was.

HYPACK®, HYSWEEP® and DREDGEPAK® are all developed by HYPACK, Inc.



A 3D Model of Bannockville Dam
(Data courtesy David Evans and Assoc., Portland, OR)

4. เครื่องวัดระดับน้ำ



HOBO Water Level Logger – U20L

The HOBOTRACK is a low-cost, research-grade water level data logger for continuously measuring water level and temperature in a wide range of underwater environments. It features 0.1% measurement accuracy, a polypropylene housing for use in both fresh and salt water, and a non-vented design for convenient and hassle-free deployment.

This data logger requires either the U-DTW-1 Waterproof Shuttle or the Base-U-4 Base Station for configuration and data offload, HOBOWare software (free download). NOTE: HOBOWare Pro is required when using the U-DTW-1 Waterproof Shuttle. See compatible items below.

5. กล้องสำรวจ



5.1. ระบบกล้องเล็ง

- กำลังขยาย 30 เท่า
- ขนาดความกว้างของภาพ 1 องศา 30 ลิปดา (26 เมตร ที่ระยะ 1 กิโลเมตร)
- ระยะเห็นภาพชัดใกล้สุดไม่เกิน 1.7 เมตร
- ตัวกล้องถอดจากฐานกล้องได้
- Laser Plummet ค่าความถูกต้อง 1.5 มิลลิเมตร ที่ระยะ 1.5 เมตร

5.2. ระบบการวัดมุม

- ระบบวัดมุมแบบ Absolute, Continuous, Diametric แสดงผลบนจอ LCD ทั้งสองด้าน
- ความละเอียด (Accuracy) 5 พิลิปดา
- มีระบบ Compensator แบบ Quadruple axis
- โครงสร้างกล้อง ป้องกันละอองน้ำและฝุ่นได้ ตามมาตรฐาน IP54

5.3. ระบบการวัดระยะทาง

- วัดระยะทางได้ 1.7 ถึง 250 เมตร โดยไม่ใช้เป้าสะท้อน และในสภาวะอากาศปกติ วัดระยะทางได้ 3,000 เมตร โดยใช้เป้าสะท้อนแบบ 1 ดวง
- แสดงค่าการวัดได้ละเอียด 1 มิลลิเมตร (Precise mode)
- ความถูกต้องของการวัดระยะโหมต ใช้เป้าสะท้อน เท่ากับ $\pm(2\text{mm} + 2\text{ppm})$ และโหมต Reflectorless เท่ากับ $\pm(3\text{mm} + 2\text{ppm})$

ภาคผนวก ง

ใบรับรองการสอบเทียบเครื่องมือ



right solutions.
right partner.

รายการเครื่องมือที่ใช้ในการวิเคราะห์ / ทดสอบ

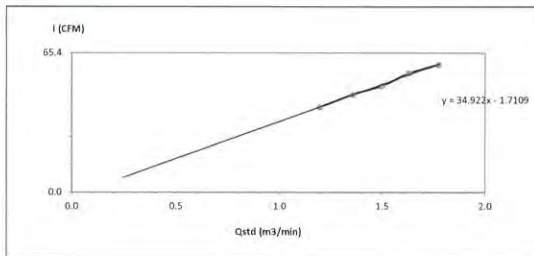
Sample Name	Parameter	Equipment Name	ID No.	Calibrated Date	Next Cal	Freq. Calibrate (Months)
Ambient	Total Suspended Particulate	High Volume	SGK_FS0119	-	-	On site Calibration
Ambient	Total Suspended Particulate	High Volume	SGK_FS0060	-	-	On site Calibration
Ambient	Total Suspended Particulate	Digital Balance	BKK_EN0004	8-Feb-23	8-Feb-24	12
Ambient	Particulate Matter (PM-10)	High Volume	SGK_FS0063	-	-	On site Calibration
Ambient	Particulate Matter (PM-10)	High Volume	SGK_FS0065	-	-	On site Calibration
Ambient	Particulate Matter (PM-10)	Digital Balance	BKK_EN0004	8-Feb-23	8-Feb-24	12
Ambient	Carbon Monoxide	CO Analyzer	BKK_FS0790	1-Jul-23	1-Jan-24	6
Ambient	Carbon Monoxide	CO Analyzer	SGK_FS0068	1-Jul-23	1-Jan-24	6
Ambient	Total Hydrocarbon as Methane	Field Rotameter	SGK_FS0141	6-Oct-23	6-Jan-24	3
Ambient	Total Hydrocarbon as Methane	Total Hydrocarbon Analyzer	BKK_EN0057	9-Aug-22	9-Feb-24	18
Noise	Leq 24 hrs	Sound Calibrator	SGK_FS0114	14-Nov-22	14-Nov-23	12
Noise	Leq 24 hrs	Sound Level Meter	SGK_FS0129	26-Jan-23	26-Jan-24	12
Noise	Leq 24 hrs	Sound Level Meter	SGK_FS0131	27-Mar-23	27-Mar-24	12
Noise	Leq 24 hrs	Sound Level Meter	SGK_FS0132	27-Mar-23	27-Mar-24	12
Noise	Leq 8 hrs	Sound Calibrator	SGK_FS0114	14-Nov-22	14-Nov-23	12
Noise	Leq 8 hrs	Sound Level Meter	SGK_FS0129	26-Jan-23	26-Jan-24	12
Sea Water	BOD	Incubator	SGK_CL0028	13-Jul-23	13-Jan-25	18
Sea Water	BOD	DO/BOD Analyser	SGK_CL0073	21-Nov-22	21-May-24	18
Sea Water	pH at 25 °C	pH meter	SGK_CL0030	28-Apr-23	28-Oct-24	18
Sea Water	Oil & Grease	Electronic Top-Loading Balance	SGK_CL0045	25-Jan-23	25-Jan-24	12
Sea Water	Oil & Grease	Oven	SGK_CL0024	28-Apr-23	28-Oct-24	18
Sea Water	Oil & Grease	Water Bath	SGK_CL0035	13-Jul-23	13-Jan-25	18
Sea Water	Temperature	pH meter	SGK_FS0051	21-Aug-23	21-Aug-24	12
Sea Water	Total Suspended Solids	Electronic Top-Loading Balance	SGK_CL0045	25-Jan-23	25-Jan-24	12
Sea Water	Total Suspended Solids	Oven	SGK_CL0024	28-Apr-23	28-Oct-24	18
Sea Water	Salinity	Conductivity meter	SGK_FS0051	21-Aug-23	21-Aug-24	12
Sea Water	Turbidity	Turbidity Meter	SGK_FS0046	30-May-23	30-May-24	12
Sea Water	Total Coliform	Autoclave	SGK_ML0001	5-Jan-23	5-Jul-24	18
Sea Water	Total Coliform	Incubator	SGK_ML0013	6-Aug-22	6-Feb-24	18
Sea Water	Total Coliform	pH Meter	SGK_ML0016	5-Jan-23	5-Jul-24	18
Sea Water	Total Coliform	Water Bath	SGK_ML0021	30-Jan-23	30-Jul-24	18
Sea Water	Fecal Coliform	Autoclave	SGK_ML0001	5-Jan-23	5-Jul-24	18
Sea Water	Fecal Coliform	Incubator	SGK_ML0013	6-Aug-22	6-Feb-24	18
Sea Water	Fecal Coliform	pH Meter	SGK_ML0016	5-Jan-23	5-Jul-24	18
Sea Water	Fecal Coliform	Water Bath	SGK_ML0021	30-Jan-23	30-Jul-24	18
Sea Water	Sulfide	Burette	BKK_EN0171	30-Aug-22	1-Mar-24	18
Sea Water	Sulfide	Chamber (Cold Room)	BKK_EN0167	30-Jun-22	30-Dec-23	18
Sea Water	Nitrate	Ion Chromatography	BKK_EN0069	12-Jan-23	12-Jan-24	12
Sea Water	Phosphate	Ion Chromatography	BKK_EN0069	12-Jan-23	12-Jan-24	12
Songkhla Lab	BOD	Incubator	SGK_CL0028	13-Jul-23	13-Jan-25	18
Songkhla Lab	BOD	DO/BOD Analyser	SGK_CL0073	21-Nov-22	21-May-24	18
Songkhla Lab	COD	COD Reactor	SGK_CL0085	23-Jan-23	23-Jan-24	12
Songkhla Lab	COD	Spectrophotometer	SGK_CL0038	24-Jan-23	24-Jan-24	12
Songkhla Lab	pH at 25 °C	pH meter	SGK_CL0030	28-Apr-23	28-Oct-24	18
Songkhla Lab	Oil & Grease	Electronic Top-Loading Balance	SGK_CL0045	25-Jan-23	25-Jan-24	12
Songkhla Lab	Oil & Grease	Oven	SGK_CL0024	28-Apr-23	28-Oct-24	18
Songkhla Lab	Oil & Grease	Water Bath	SGK_CL0035	13-Jul-23	13-Jan-25	18
Songkhla Lab	Total Dissolved Solids 180°C	Electronic Top-Loading Balance	SGK_CL0045	25-Jan-23	25-Jan-24	12
Songkhla Lab	Total Dissolved Solids 180°C	Oven	SGK_CL0024	28-Apr-23	28-Oct-24	18
Songkhla Lab	Total Suspended Solids	Electronic Top-Loading Balance	SGK_CL0045	25-Jan-23	25-Jan-24	12
Songkhla Lab	Total Suspended Solids	Oven	SGK_CL0024	28-Apr-23	28-Oct-24	18



High Volume Air Sampler Calibration Worksheet

Project Site: PTTEP International Limited Barometric Pressure (mm Hg): 756
 Calibrate Location: บริษัท ปตท. จำกัด (มหาชน) Temperature (°C): 31
 Calibrate Date: 8-Nov-23 High Volume ID: SGK-FS0119
 Calibration Sheet No.: C-081123-SGK-FS0119 High Volume Model: TE-S170D
 Calibrator ID: SGK-FS0034 High Volume S/N: 1062
 Calibrator Model: TE-S028A Calibrator Slope: 1.55835
 Calibrator S/N: 3449 Calibrator Intercept: -0.0282

Test No.	Delta H ₂ O (inch)	Q _{std} (m ³ /min)	I: Chart (CFM)	Linear Regression
1	3.4	1.1966	40	Slope: 34.9221
2	4.4	1.3574	46	Intercept: -1.7109
3	5.4	1.5007	50	Correlation Coefficient: 0.9976
4	6.4	1.6313	56	
5	7.6	1.7751	60	



Calibrated by: Narathorn K. (Mr. Narathorn Keawpongs) Field Scientist(1)
 Approved by: (Mr. Noppong Juntarapan) Enviro Field Coordinator Scientist (3)

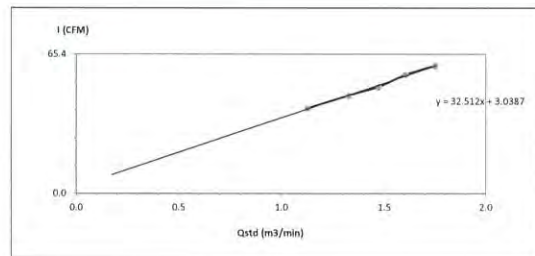
FORM NO. F-06-073 REVISION NO. - ISSUE DATE: 14/03/16



High Volume Air Sampler Calibration Worksheet

Project Site: PTTEP International Limited Barometric Pressure (mm Hg): 756
 Calibrate Location: บริษัท ปตท. จำกัด (มหาชน) Temperature (°C): 31
 Calibrate Date: 8-Nov-23 High Volume ID: SGK-FS0060
 Calibration Sheet No.: C-081123-SGK-FS0060 High Volume Model: TE-S170D
 Calibrator ID: SGK-FS0034 High Volume S/N: 5586
 Calibrator Model: TE-S028A Calibrator Slope: 1.55835
 Calibrator S/N: 3449 Calibrator Intercept: -0.0282

Test No.	Delta H ₂ O (inch)	Q _{std} (m ³ /min)	I: Chart (CFM)	Linear Regression
1	3.0	1.1257	40	Slope: 32.5120
2	4.2	1.3268	46	Intercept: 3.0387
3	5.2	1.4732	50	Correlation Coefficient: 0.9968
4	6.2	1.6060	56	
5	7.4	1.7519	60	



Calibrated by: Narathorn K. (Mr. Narathorn Keawpongs) Field Scientist(1)
 Approved by: (Mr. Noppong Juntarapan) Enviro Field Coordinator Scientist (3)

FORM NO. F-06-073 REVISION NO. - ISSUE DATE: 14/03/16

Sartorius (Thailand) Co., Ltd.
 129 Rama 9 Road, Huaykwang, Huaykwang, Bangkok 10310
 Tel: +66 2643 6361-6, e-mail: service.thailand@sartorius.com



SARTORIUS

Certificate of Calibration

Model Number: XP105DU Certificate No.: 23BC10071
 Description: Semi-micro Balance Issued Date: Monday, February 13, 2023
 Serial Number: 1123091884 Reference No.: 203245
 ID No: BKK_EN0004
 Manufacturer: Mettler Toledo Page No.: 1 of 3

Customer Name: ALS Laboratory Group (Thailand) Co., Ltd.
 104 Phatthanakan 40, Phatthanakan Rd., Khwaeng Phatthanakan, Khet Suan Luang, Bangkok 10250

Calibrated Place: Balance Room

Calibrated By: Mr. Chonchai Inthana
 Calibration Date: Wednesday, February 08, 2023

Metrological data: Capacity: 31/120 g Readability: 0.0001 g
 Ambient Conditions: Temperature: 21.0 °C ± 3.0 °C
 Humidity: 65.0 % RH ± 5.0 % RH
 Pressure: ±

Reasons for calibration: ☐ New Installation ☐ Service / Repaired ☒ Re-calibration/ Maintenance ☐ Equipment Condition: ☒ Good Operation ☐ Fair

Measurement Method UKAS Publication Ref: Lab 14

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). The calibration certificate documents the traceability to National Standards, which realise the unit of measurement according to the International Standard System of Units (SI). Report of Tolerance came from list of Sartorius Metrological Specifications.

Traceability:

Model Number	Description	Traceability	Certificate No.	Due Date
YCS011-522-00	Sartorius weight set 1mg - 1kg E2 s/n 37629119	SPC-RT	C02212565	14-Sep-2023
MHB-382SD	Humidity/Barometer/Temp. Lutron MHB-382SD	DKSH	C19220444	5-Sep-2023

This certificate relate and apply this equipment only
 This certificate may not be reproduced other than in full except with the prior written approval of the Verification Operation Division Sartorius (Thailand) Co., Ltd.

Mr. Chonchai Inthana (Technical Manager)



Sartorius (Thailand) Co., Ltd.
 129 Rama 9 Road, Huaykwang, Huaykwang, Bangkok 10310
 Tel: +66 2643 6361-6 Fax: +66 2643 6367

SARTORIUS

Certificate of Calibration

Model Number: XP105DU Certificate No.: 23BC10071
 Description: Semi-micro Balance Issued Date: Monday, February 13, 2023
 Serial Number: 1123091884 Reference No.: 203245
 ID No: BKK_EN0004
 Manufacturer: Mettler Toledo Page No.: 2 of 3

Calibration Results : Without Adjustment

Repeatability	Eccentricity (Off-center loading error)
The repeatability is the ability of a weighing instrument to display nearly identical readings under constant test conditions when the same load within a measurement series is placed repeatedly on the weighing pan in the same manner. The standard deviation is used to express repeatability quantitatively.	The off-center loading error is yielded by the difference between the result of the load, i.e. 103 or 114 of maximum capacity, placed in the middle of the weighing pan and between each of four additional measurement points (positions defined according to OIML R75).
Nominal Value : (Low Load) 2 g Tolerance N/A g	Nominal value : 20 g Tolerance N/A g
Nominal Value : (High Load) 20 g Tolerance N/A g	
Standard Deviation 0.000005 0.000007	

Linearity

The linearity, also called linearity error, describes the deviation of the characteristic curve of a weighing instrument from the linear slope.

Tolerance	N/A	g
Nominal Value	Conventional Mass Value	Displayed Value
0.1 g	0.10000	0.10000
0.5 g	0.50001	0.50000
1 g	1.00000	1.00000
2 g	2.00002	2.00001
5 g	5.00002	5.00002
10 g	10.00002	10.00002
15 g	15.00004	15.00004
20 g	20.00000	20.00000
25 g	25.00002	25.00002
30 g	30.00002	30.00004

SOP FM 33 03 February 2022

Certificate of Calibration

Model Number : XS105DU
Description : Semi-micro Balance
Serial Number : 1123091884
ID No. : BKK_EN0004
Manufacturer : Mettler Toledo

Certificate No. : 23BCI0071
Issued Date : Monday, February 13, 2023
Reference No. : 203245
Page No. : 3 of 3

Calibration Results : Without Adjustment

Repeatability
The repeatability is the ability of a weighing instrument to display nearly identical readings under constant test conditions when the same load within a measurement series is placed repeatedly on the weighing pan in the same manner. The standard deviation is used to express repeatability quantitatively.

Nominal Value (Low Load)	g	100.0000
Tolerance	N/A	100.0000
Nominal Value (High Load)	100	100.0000
Tolerance	N/A	99.9999
Standard Deviation		0.00003

Eccentricity (Off-center loading error)
The off-center loading error is yielded by the difference between the readout of the load, i.e. 1/2 or 1/4 of maximum capacity, placed in the middle of the weighing pan and between each of four additional measurement points (positions defined according to OIML R76).

Nominal value	g	9
Tolerance	N/A	9

Linearity
The linearity, also called linearity error, describes the deviation of the characteristic curve of a weighing instrument from the linear slope.

Tolerance	N/A	g
Nominal Value		
(g)	(g)	(g)
50	50.0000	50.0000
55	55.0000	55.0000
60	60.0000	60.0000
65	65.0001	65.0001
70	70.0000	70.0000
80	80.0000	80.0000
90	90.0001	90.0001
100	100.0000	100.0000
110	110.0000	110.0000
120	120.0000	120.0000

End of Report

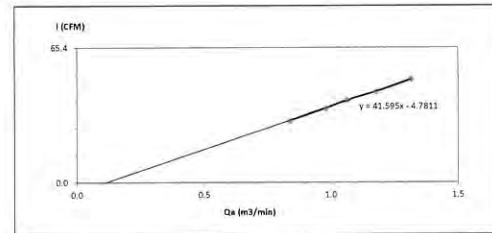
SOP FM 33 03 February 2022



High Volume Air Sampler Calibration Worksheet

Project Site : PTTEP International Limited
Barometric Pressure (mm Hg) : 756
Calibrate Location : บริษัท ปตท. จำกัด (มหาชน)
Temperature (°C) : 31
Calibrate Date : 8-Nov-23
High Volume ID : SGK-FS0063
Calibration Sheet No. : C-081123-SGK-FS0063
High Volume Model : TE-5009X
Calibrator ID : SGK-FS0034
High Volume S/N : 5578
Calibrator Model : TE-5028A
Calibrator Slope : 0.97611
Calibrator S/N : 3449
Calibrator Intercept : -0.01774

Test No.	Delta H ₂ O (inch)	Q _a (m ³ /min)	I: Chart (CFM)	Linear Regression
1	1.6	0.839	30	Slope : 41.5952
2	2.2	0.981	36	Intercept : -4.7811
3	2.6	1.065	40	Correlation Coefficient : 0.9993
4	3.2	1.180	44	
5	4.0	1.317	50	



Calibrated by : Narathorn K.
(Mr. Narathorn Keawpongse)
Field Scientist(1)

Approved by :
(Mr. Noppong Juntarupan)
Enviro Field Coordinator Scientist (3)

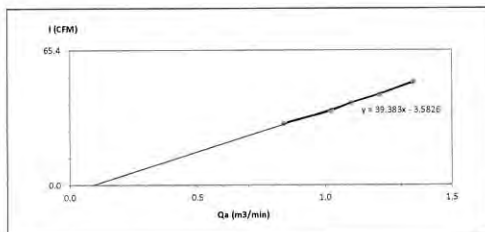
FORM NO. F 06-074 REVISION NO. : ISSUE DATE: 14/03/16



High Volume Air Sampler Calibration Worksheet

Project Site : PTTEP International Limited
Barometric Pressure (mm Hg) : 756
Calibrate Location : บริษัท ปตท. จำกัด (มหาชน)
Temperature (°C) : 31
Calibrate Date : 8-Nov-23
High Volume ID : SGK-FS0065
Calibration Sheet No. : C-081123-SGK-FS0065
High Volume Model : TE-5009X
Calibrator ID : SGK-FS0034
High Volume S/N : 5580
Calibrator Model : TE-5028A
Calibrator Slope : 0.97611
Calibrator S/N : 3449
Calibrator Intercept : -0.01774

Test No.	Delta H ₂ O (inch)	Q _a (m ³ /min)	I: Chart (CFM)	Linear Regression
1	1.6	0.839	30	Slope : 39.3828
2	2.4	1.024	36	Intercept : -3.5826
3	2.8	1.105	40	Correlation Coefficient : 0.9976
4	3.4	1.216	44	
5	4.2	1.349	50	



Calibrated by : Narathorn K.
(Mr. Narathorn Keawpongse)
Field Scientist(1)

Approved by :
(Mr. Noppong Juntarupan)
Enviro Field Coordinator Scientist (3)

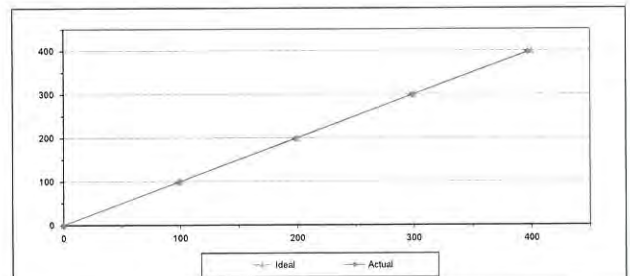
FORM NO. F 06-074 REVISION NO. : ISSUE DATE: 14/03/16



MULTIPOINT CALIBRATION REPORT

Calibration Date : 1-Jul-23
Equipment Name : CO Analyzer
Manufacturer : HORIBA
Model : APMA-370
Serial No. : SLVKS07G
Equipment ID : BKK-FS0790
Calibrator Manufacturer : Teledyne API
Model : 700
Serial No. : 847
Std. Gas Concentration (PPM) : 55.22
Cylinder No. : GN0027222
Cylinder Pressure (psi) : 1800
Certified By : Airgas Inc.
Certified Date : 8-Feb-22
Expired Date : 8-Feb-30

Point	Ideal	Actual	Error	%Error
ZERO	0.00	0.10	0.10	0.10
1	100.00	98.70	-1.30	-1.30
2	200.00	198.50	-1.50	-0.75
3	300.00	298.50	-1.50	-0.50
4	400.00	397.00	-3.00	-0.75
AVERAGE (%)				-0.64



Calibrated By

Approved By

(Mr. Jirawat Sakam)
Field Environmental Scientist (3)

(Mr. Sarayuth Jitbanont)
Assistant General Manager

ALS Laboratory Group
FORM NO. F 06-056 REVISION NO. : ISSUE DATE: 02/04/12

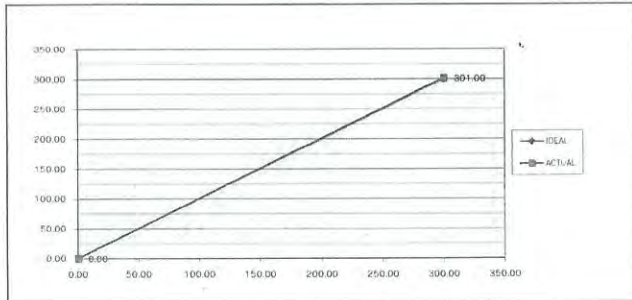


CALIBRATION REPORT

CUSTOMER NAME : ALS Laboratory Group (Thailand) Co., Ltd.			
EQUIPMENT NAME : Total Hydrocarbon Analyzer			
MANUFACTURER : Baseline	MODEL : 9000 NMHC	SERIAL NO : 0314DR0170	
STANDARD GAS CONCENTRATION (PPM) : 100 PPM (Propane)		CYLINDER NO : ND55981	
CYLINDER PRESSURE (psig) : 900 PSI		CERTIFIED DATE : 12/02/2022	
CERTIFIED BY : AIRGAS		EXPIRED DATE : 12/02/2025	

CALIBRATION RESULTS

POINT NO	CALIBRATION RESULTS			
	IDEAL	ACTUAL	ERROR	%ERROR
ZERO	0.00	0.00	0.00	-
1	300.00	301.00	1.0	0.33
AVERAGE (%)				0.08



CALIBRATED BY : *[Signature]* DATE : 9/8/19

CHECKED BY : *[Signature]* DATE : 9/8/19

ข้อมูลการสอบเทียบและผลการสอบเทียบนี้เป็นทรัพย์สินของ บริษัท เอ็ลเอส แล็บอราทอรี กรุ๊ป จำกัด (มหาชน) และ บริษัท เอ็ลเอส แล็บอราทอรี จำกัด (มหาชน) กรุณาเก็บรักษาไว้เป็นอย่างดี และส่งคืนให้บริษัท เอ็ลเอส แล็บอราทอรี กรุ๊ป จำกัด (มหาชน) และ บริษัท เอ็ลเอส แล็บอราทอรี จำกัด (มหาชน) ภายในวันที่ 12/02/2025

FO-EN-206 R00/01-08-13



FLOW CALIBRATE

CUSTOMER NAME : ALS Laboratory Group (Thailand) Co., Ltd.			
EQUIPMENT NAME : Flow Calibrator			
MANUFACTURER : Bios	MODEL : 510 L	SERIAL NO : 129549	

Flow Parameter	Step	Set	Display	Flow Meter
Sample	Before	40	38	15 cc/min
	After	40	40	39.7 cc/min
Air	Before	175	175	190 cc/min
	After	175	175	176 cc/min
Fuel	Before	35	32	36 cc/min
	After	35	35	35 cc/min

CALIBRATED BY : *[Signature]* DATE : 9/8/19

CHECKED BY : *[Signature]* DATE : 9/8/19

ข้อมูลการสอบเทียบและผลการสอบเทียบนี้เป็นทรัพย์สินของ บริษัท เอ็ลเอส แล็บอราทอรี กรุ๊ป จำกัด (มหาชน) และ บริษัท เอ็ลเอส แล็บอราทอรี จำกัด (มหาชน) กรุณาเก็บรักษาไว้เป็นอย่างดี และส่งคืนให้บริษัท เอ็ลเอส แล็บอราทอรี กรุ๊ป จำกัด (มหาชน) และ บริษัท เอ็ลเอส แล็บอราทอรี จำกัด (มหาชน) ภายในวันที่ 12/02/2025

SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

451-451/1 Sirinthorn Rd.,Bangbunru, Bangplud Bangkok 10700 THAILAND
Tel:0-2435-8800 Fax:0-2433-1679 e-mail:cal-center@sithiporn.com http://www.sithiporn.com



Cert. No. : ACC22038
Pages : 1 of 3

Calibration Certificate

Equipment : SOUND CALIBRATOR
Manufacturer : RJON
Model : NC-75
Serial No. : 35024429
ID No. : -

REVIEWED : *[Signature]*
APPROVED BY : *[Signature]*
NEXT CAL. DATE : 14/11/23

Condition As Found : GOOD

Customer : ALS LABORATORY GROUP (THAILAND) CO., LTD.
104 PHATTHANAKAN 40, PHATTHANAKAN ROAD,
KHWAENG PHATTHANAKAN, KHET SUAN LUANG,
BANGKOK, 10250 THAILAND.

Location :
Ambient Temperature : (23.0 ± 3) °C
Pressure : (101.3 ± 3) kPa
Relative Humidity : (50.0 ± 20) %

Received Date : 03 NOVEMBER 2022
Calibration Date : 14 NOVEMBER 2022
Date of Issue : 15 NOVEMBER 2022

Calibrated by : Nathakorn Pisutpaisan

Approved by : *[Signature]*
(Thanakul Petchurai)

This certificate is issued in accordance with the requirements of ISO/IEC 17025 standard, may not be reproduced other than in full, except with the prior written approval of the head of Calibration Laboratory.

QF-TS12-04-04-020664

SITHIPORN SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

Continuation of Calibration Certificate

Cert. No. : ACC22038
Job No. : VC66AC0006
Pages : 2 of 3

Calibration Procedure : CP-AC-03

Calibration Method :

This equipment was calibrated by based on IEC-60942-2003 Standard.

The sound pressure level, frequency and total distortion of the sound calibrator was measured using the reference microphone.

Condition of this result of calibration :

1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33511B	MY52302742	EF-0008-22	04-Feb-23
Digital Multimeter	33461A	MY53220104	EEL-BP_04-0265	09-Feb-23
Digital Multimeter	33461A	MY53220076	EEL-BP_03-0265	09-Feb-23
Digital Multimeter	33461A	MY60024273	EEL-BP_05-0265	09-Feb-23
Programmable Attenuator	MAT-1070	62100114	EF-0009-22	07-Feb-23
Condenser Microphone	4180	2977900	AA-1013-22	24-Feb-23
Measuring Amplifier	NA-42KA1	34560495	AA-3005-22	22-Feb-23
Audio Analyzer	AVR-3360A	V744B6069	EF-0010-22	07-Feb-23

2. This result of calibration was found accurate as shown on date and place of calibration for this calibrated item only.

3. This certificate is traceable to the international system of unit maintained at :

- 3.1 National Institute of Metrology (Thailand).
- 3.2 Thailand Institute of Scientific and Technological Research (TISTR).

QF-TS12-04-04-020664

[Signature]

Continuation of Calibration Certificate

Cert. No. : ACC22038
Job No. : VC66AC0006
Pages : 3 of 3

Result of calibration :

1. Sound pressure level

Specified sound pressure level (dB)	Measured value (dB)	Deviated value (dB)	Uncertainty (dB)	Tolerance limit (dB)
94	93.94	-0.06	0.14	0.40

2. Frequency

Specified Frequency (Hz)	Measured value (Hz)	Deviated value (%)	Uncertainty (%)	Tolerance limit (%)
1000	1000.0	0.0	0.1	1.0

3. Total distortion

Measured value (%)	Uncertainty (%)	Tolerance limit (%)
0.33	0.10	3.0

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

End of Calibration Certificate

QF-TS12-04-04-020664

451-451/1 Sirinthon Rd, Bangbunru, Bangplud Bangkok 10700 THAILAND.
Tel:0-2435-8800 Fax:0-2433-1679 e-mail:cal-center@sithiporn.com http://www.sithiporn.com



Cert. No. : ACL23093
Pages : 1 of 8

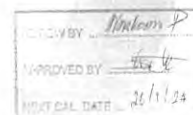
Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-52A / Microphone UC-59 / Preamplifier NH-25
Serial No. : 01120942 / 21945 / 22331
ID No. : -

Condition As Found : GOOD

Customer : ALS LABORATORY GROUP (THAILAND) CO., LTD.
104 PHATTHANAKAN 40, PHATTHANAKAN ROAD,
KHWAENG PHATTHANAKAN, KHET SUAN LUANG,
BANGKOK, 10250 THAILAND.

Location : -
Ambient Temperature : (23.0 ± 3) °C
Pressure : (101.3 ± 3) kPa
Relative Humidity : (50.0 ± 20) %
Received Date : 24 JANUARY 2023
Calibration Date : 26-30 JANUARY 2023
Date of Issue : 31 JANUARY 2023



Calibrated by : Nathakorn Pisutpaisan

Approved by : *T. Petchur*
(Thanakul Petchurai)

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Continuation of Calibration Certificate

Cert. No. : ACL23093
Job No. : VC66AC0030
Pages : 2 of 8

Calibration Procedure : CP-AC-01

Calibration Method :

This equipment was calibrated by based on IEC-61672-3 (2013) Standard for sound level meter (SLM).
The SLM had tests to Acoustical and Electrical signal tests of frequency weighting with Anechoic chamber and Reference Standard Instruments.

For tests results of each items were made by observation of each Instruments display and also with SLM's display.

Condition of this result of calibration :

i. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33210A	MY48017076	EF-0007-22	04-Feb-23
Waveform Generator	33511B	MY52302742	EF-0008-22	04-Feb-23
Digital Multimeter	33461A	MY53220104	EEL-BP_04/0265	09-Feb-23
Digital Multimeter	33461A	MY53220076	EEL-BP_03/0265	09-Feb-23
Digital Multimeter	34461A	MY60024273	EEL-BP_05/0265	09-Feb-23
Programmable Attenuator	MAT-1070	62100114	EF-0009-22	07-Feb-23
Condenser Microphone	4180	2977900	AA-1013-22	24-Feb-23
Measuring Amplifier	NA-42KAI	34560495	AA-3005-22	22-Feb-23

2. This result of calibration was found accurate as shown on date and place of calibration for this calibrated item only.

3. This certificate is traceable to the international system of unit maintained at :

- 3.1 National Institute of Metrology (Thailand),
- 3.2 Thailand Institute of Scientific and Technological Research (TISTR).

QF-TS12-04-04-020664

Continuation of Calibration Certificate

Cert. No. : ACL23093
Job No. : VC66AC0030
Pages : 3 of 8

Summary of Measurement Result :

Parameter	Pass	Fail	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1. Absolute sensitivity	✓	-	0.2	N/A
2. Self-generated noise	✓	-	0.2	N/A
3. Acoustical signal tests of frequency weightings				
125 Hz	✓	-	0.3	0.6
1000 Hz	✓	-	0.3	0.6
8000 Hz	✓	-	0.3	0.7
4. Electrical signal tests of frequency weightings				
For 10 Hz to 4 kHz	✓	-	0.3	0.6
For > 4 kHz to 10 kHz	✓	-	0.3	0.7
For > 10 kHz to 20 kHz	✓	-	0.3	1.0
5. Frequency and time weightings at 1 kHz	✓	-	0.2	0.2
6. Long - term stability	✓	-	0.1	0.1
7. Level linearity on the reference level range	✓	-	0.2	0.3
8. Level linearity including the level range control	✓	-	0.2	0.3
9. Tone burst response	✓	-	0.2	0.3
10. Peak C sound level	✓	-	0.2	0.35
11. Overload indication	✓	-	0.2	0.25
12. High level stability	✓	-	0.1	0.1

QF-TS12-04-04-020664

Continuation of Calibration Certificate

Cert. No. : ACL23093
Job No. : VC66AC0030
Pages : 4 of 8

Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.9 (93.95)	94.0	0.0	±0.3

2. Self-generated noise

2.1 Normal test

Measured Value (dB)
14.2

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

Frequency Weighting	Measured value (dB)
A - weight	10.8
C - weight	15.7
Flat	21.3

3. Acoustical signal tests of frequency weightings

Meter free-field acoustic response at a level of 84 dB

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
125	0.1	0.1	0.1	± 1.0
1000	0.1	0.1	0.1	± 0.7
8000	-0.3	-0.2	-0.2	+ 1.5, - 2.5

QF-TS12-04-04-020664

T. Retch.

Continuation of Calibration Certificate

Cert. No. : ACL23093
Job No. : VC66AC0030
Pages : 5 of 8

4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
63	0.0	-0.1	-0.1	±1.0
125	-0.1	0.0	-0.1	±1.0
250	0.0	0.0	-0.1	±1.0
500	0.0	0.0	-0.1	±1.0
1000	0.0	0.0	0.0	±1.0
2000	0.0	0.0	0.0	±1.0
4000	0.0	0.0	0.0	±1.0
8000	0.0	0.0	0.1	+ 1.5, - 2.5
16000	0.0	-1.2	-1.2	+ 2.5, -16.0

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

Frequency Weighting	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	94.0	0.0	-
C - weight	94.0	0.0	± 0.2
Flat	94.0	0.0	± 0.2

5.2 Time weighting at 1 kHz

Frequency Weighting	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	94.0	0.0	-
Slow	94.0	0.0	± 0.1
Leq	94.0	0.0	± 0.1

6. Long - term stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	94.0	94.0	0.0	± 0.1

QF-TS12-04-04-020664

T. Retch.

Continuation of Calibration Certificate

Cert. No. : ACL23093
Job No. : VC66AC0030
Pages : 6 of 8

7. Level linearity on the reference level range

Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
137.0	137.1	0.1	±0.8
136.0	136.1	0.1	±0.8
135.0	135.1	0.1	±0.8
134.0	134.1	0.1	±0.8
133.0	133.1	0.1	±0.8
132.0	132.1	0.1	±0.8
131.0	131.0	0.0	±0.8
129.0	129.1	0.1	±0.8
124.0	124.0	0.0	±0.8
119.0	119.1	0.1	±0.8
114.0	114.1	0.1	±0.8
109.0	109.1	0.1	±0.8
104.0	104.1	0.1	±0.8
99.0	99.1	0.1	±0.8
94.0	94.0	0.0	±0.8
89.0	89.0	0.0	±0.8
84.0	84.0	0.0	±0.8
79.0	79.0	0.0	±0.8
74.0	74.0	0.0	±0.8
69.0	69.0	0.0	±0.8
64.0	64.0	0.0	±0.8
59.0	59.0	0.0	±0.8
54.0	54.0	0.0	±0.8
49.0	49.0	0.0	±0.8
44.0	44.0	0.0	±0.8
39.0	39.0	0.0	±0.8
34.0	34.0	0.0	±0.8
30.0	29.9	-0.1	±0.8
29.0	28.9	-0.1	±0.8
28.0	27.9	-0.1	±0.8
27.0	26.9	-0.1	±0.8
26.0	25.9	-0.1	±0.8
25.0	24.9	-0.1	±0.8

QF-TS12-04-04-020664

T. Retch.

Continuation of Calibration Certificate

Cert. No. : ACL23093
Job No. : VC66AC0030
Pages : 7 of 8

8. Level linearity including the level range control

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Auto	94.0	94.0	0.0	±0.8

9. Tone burst response

Time Weighting	Tone burst duration, Tb (ms)	Cycle	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	0.25	1	108.0	107.9	-0.1	1.5 ; -5.0
	2	8	117.0	117.0	0.0	1.0 ; -2.5
	200	800	134.0	134.0	0.0	±1.0
Slow	2	8	108.0	108.0	0.0	1.5 ; -5.0
	200	800	127.6	127.6	0.0	±1.0
	0.25	1	99.0	98.9	-0.1	1.5 ; -5.0
SEL	2	8	108.0	108.0	0.0	1.0 ; -2.5
	200	800	128.0	128.0	0.0	±1.0

10. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, L _{peak} (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	-
One	136.4	136.4	0.0	±2.0

Number of cycle in test signal	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	-
Positive half cycle	135.4	135.2	-0.2	±1.0
Negative half cycle	135.4	135.1	-0.3	±1.0

QF-TS12-04-04-020664

T. Retch.

Continuation of Calibration Certificate

Cert. No. : ACL23093
Job No. : VC66AC0030
Pages : 8 of 8

11. Overload indication

Measured value (dB)		Deviated Value (dB)	Acceptance Limits (dB)
Positive one-half cycle	Negative one-half cycle		
89.5	89.6	0.1	±1.5

12. High level stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	137.0	137.0	0.0	±0.1

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

End of Calibration Certificate

QF-TS12-04-04-020664

451-451/1 Sirinthorn Rd, Bangbunru, Bangplud Bangkok 10700 THAILAND.
Tel:0-2435-8800 Fax:0-2433-1679 e-mail:cal-center@sithiporn.com http://www.sithiporn.comCert. No. : ACL23105
Job No. : VC66AC0042
Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-52A / Microphone UC-59 / Preamplifier NH-25
Serial No. : 00331094 / 22922 / 22569
ID No. : -

Condition As Found : GOOD

Customer : ALS LABORATORY GROUP (THAILAND) CO., LTD.
104 PHATTHANAKAN 40, PHATTHANAKAN ROAD,
KHAENG PHATTHANAKAN, KHET SUAN LUANG,
BANGKOK, 10250 THAILAND.

Location : -
Ambient Temperature : (23.0 ± 3) °C
Pressure : (101.3 ± 3) kPa
Relative Humidity : (50.0 ± 20) %

Received Date : 17 MARCH 2023
Calibration Date : 27-28 MARCH 2023
Date of Issue : 31 MARCH 2023



Calibrated by : Nathakorn Pisutpaisan

Approved by :

(Thanakul Petchurai)

This certificate is issued in accordance with the requirements of ISO/IEC 17025 standard, may not be reproduced
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Continuation of Calibration Certificate

Cert. No. : ACL23105
Job No. : VC66AC0042
Pages : 2 of 8

Calibration Procedure : CP-AC-01

Calibration Method :

This equipment was calibrated by based on IEC-61672-3 (2013) Standard for sound level meter (SLM).
The SLM had tests to Acoustical and Electrical signal tests of frequency weighting with Anechoic chamber and Reference
Standard Instruments.

For tests results of each items were made by observation of each Instruments display and also with SLM's display.

Condition of this result of calibration :

1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33210A	MY48017076	EF-0009-23	07-FEB-24
Waveform Generator	33511B	MY52302742	EF-0010-23	07-FEB-24
Digital Multimeter	33461A	MY53220104	EEL-BP 30/0266	13-FEB-24
Digital Multimeter	33461A	MY53220076	EEL-BP 29/0266	13-FEB-24
Digital Multimeter	34461A	MY60024273	EEL-BP 31/0266	14-FEB-24
Programmable Attenuator	MAT-1070	62100114	EF-0011-23	08-FEB-24
Condenser Microphone	4180	2977900	AA-1001-23	14-FEB-24
Measuring Amplifier	NA-42KAI	34560495	AA-3002-23	14-FEB-24

2. This result of calibration was found accurate as shown on date and place of calibration for this calibrated item only.

3. This certificate is traceable to the international system of unit maintained at :

3.1 National Institute of Metrology (Thailand).

3.2 Thailand Institute of Scientific and Technological Research (TISTR).

QF-TS12-04-04-020664

Continuation of Calibration Certificate

Cert. No. : ACL23105
Job No. : VC66AC0042
Pages : 3 of 8

Summary of Measurement Result :

Parameter	Pass	Fail	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1. Absolute sensitivity	✓	-	0.2	N/A
2. Self-generated noise	✓	-	0.2	N/A
3. Acoustical signal tests of frequency weightings				
125 Hz	✓	-	0.3	0.6
1000 Hz	✓	-	0.3	0.6
8000 Hz	✓	-	0.3	0.7
4. Electrical signal tests of frequency weightings				
For 10 Hz to 4 kHz	✓	-	0.3	0.6
For > 4 kHz to 10 kHz	✓	-	0.3	0.7
For > 10 kHz to 20 kHz	✓	-	0.3	1.0
5. Frequency and time weightings at 1 kHz	✓	-	0.2	0.2
6. Long - term stability	✓	-	0.1	0.1
7. Level linearity on the reference level range	✓	-	0.2	0.3
8. Level linearity including the level range control	✓	-	0.2	0.3
9. Tone burst response	✓	-	0.2	0.3
10. Peak C sound level	✓	-	0.2	0.35
11. Overload indication	✓	-	0.2	0.25
12. High level stability	✓	-	0.1	0.1

Note : Pass/Fail evaluation for each parameter,
will be considered together from the acceptance limit and the Maximum-permitted uncertainty of measurement.

QF-TS12-04-04-020664

Continuation of Calibration Certificate

Cert. No. : ACL23105
Job No. : VC66AC0042
Pages : 4 of 8

Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.9 (93.98)	94.0	0.0	±0.3

2. Self-generated noise

2.1 Normal test

Measured Value (dB)
13.1

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

Frequency Weighting	Measured value (dB)
A - weight	8.7
C - weight	14.5
Flat	20.1

3. Acoustical signal tests of frequency weightings

Meter free-field acoustic response at a level of 84 dB

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
125	0.2	0.2	0.3	± 1.0
1000	0.1	0.1	0.1	± 0.7
8000	-0.3	-0.3	-0.2	+ 1.5, - 2.5

QF-TS12-04-04-020664

Continuation of Calibration Certificate

Cert. No. : ACL23105
Job No. : VC66AC0042
Pages : 5 of 8

4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
63	0.0	0.1	0.0	±1.0
125	0.1	0.1	0.1	±1.0
250	0.1	0.1	0.0	±1.0
500	0.0	0.1	0.0	±1.0
1000	0.0	0.0	0.0	±1.0
2000	0.0	0.1	0.0	±1.0
4000	0.0	0.0	0.0	±1.0
8000	0.0	0.1	0.1	+ 1.5, - 2.5
16000	0.0	-1.2	-1.2	+ 2.5, -16.0

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

Frequency Weighting	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	94.0	94.0	0.0	± 0.2
C - weight	94.0	94.0	0.0	± 0.2
Flat	94.0	94.0	0.0	± 0.2

5.2 Time weighting at 1 kHz

Frequency Weighting	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	94.0	94.0	0.0	± 0.1
Slow	94.0	94.0	0.0	± 0.1
Leq	94.0	94.0	0.0	± 0.1

6. Long - term stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	94.0	94.0	0.0	± 0.1

QF-TS12-04-04-020664

Continuation of Calibration Certificate

Cert. No. : ACL23105
Job No. : VC66AC0042
Pages : 6 of 8

7. Level linearity on the reference level range

Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
137.0	137.0	0.0	±0.8
136.0	136.0	0.0	±0.8
135.0	135.0	0.0	±0.8
134.0	134.0	0.0	±0.8
133.0	133.0	0.0	±0.8
132.0	132.0	0.0	±0.8
131.0	131.0	0.0	±0.8
129.0	129.0	0.0	±0.8
124.0	124.0	0.0	±0.8
119.0	119.0	0.0	±0.8
114.0	114.0	0.0	±0.8
109.0	109.0	0.0	±0.8
104.0	104.0	0.0	±0.8
99.0	99.0	0.0	±0.8
94.0	94.0	0.0	±0.8
89.0	89.0	0.0	±0.8
84.0	84.0	0.0	±0.8
79.0	79.0	0.0	±0.8
74.0	74.0	0.0	±0.8
69.0	69.0	0.0	±0.8
64.0	64.0	0.0	±0.8
59.0	59.0	0.0	±0.8
54.0	54.0	0.0	±0.8
49.0	49.0	0.0	±0.8
44.0	44.0	0.0	±0.8
39.0	39.0	0.0	±0.8
34.0	34.0	0.0	±0.8
30.0	29.9	-0.1	±0.8
29.0	28.9	-0.1	±0.8
28.0	27.9	-0.1	±0.8
27.0	26.9	-0.1	±0.8
26.0	25.9	-0.1	±0.8
25.0	24.9	-0.1	±0.8

QF-TS12-04-04-020664

Continuation of Calibration Certificate

Cert. No. : ACL23105
Job No. : VC66AC0042
Pages : 7 of 8

8. Level linearity including the level range control

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Auto	94.0	94.0	0.0	±0.8

9. Tone burst response

Time Weighting	Tone burst duration, Tb (ms)	Cycle	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	0.25	1	108.0	108.0	0.0	1.5 ; -5.0
	2	8	117.0	117.0	0.0	1.0 ; -2.5
	200	800	134.0	134.1	0.1	±1.0
Slow	2	8	108.0	108.0	0.0	1.5 ; -5.0
	200	800	127.6	127.6	0.0	±1.0
SEL	0.25	1	99.0	98.9	-0.1	1.5 ; -5.0
	2	8	108.0	108.0	0.0	1.0 ; -2.5
	200	800	128.0	128.1	0.1	±1.0

10. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, L _{peak} (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	±2.0
One	136.4	136.2	-0.2	±2.0

Number of cycle in test signal	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	±1.0
Positive half cycle	135.4	135.1	-0.3	±1.0
Negative half cycle	135.4	135.1	-0.3	±1.0

QF-TS12-04-04-020664

Continuation of Calibration Certificate

Cert. No. : ACL23105
Job No. : VC66AC0042
Pages : 8 of 8

11. Overload indication

Measured value (dB)		Deviated Value (dB)	Acceptance Limits (dB)
Positive one-half cycle	Negative one-half cycle		
89.5	89.5	0.0	±1.5

12. High level stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	137.0	137.0	0.0	±0.1

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

End of Calibration Certificate

QF-TS12-04-04-020664

451-451/1 Srinthom Rd, Bangbunru, Bangplud Bangkok 10708 THAILAND.
Tel:0-2435-8800 Fax:0-2433-1679 e-mail:cal-center@sithiporn.com http://www.sithiporn.comCert. No. : ACL23106
Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-52A / Microphone UC-59 / Preamplifier NH-25
Serial No.: 00331095 / 22927 / 22570
ID No.: -

Condition As Found : GOOD

Customer : ALS LABORATORY GROUP (THAILAND) CO., LTD.
104 PHATTHANAKAN 40, PHATTHANAKAN ROAD,
KHWAENG PHATTHANAKAN, KHET SUAN LUANG,
BANGKOK, 10250 THAILAND.

Location : -
Ambient Temperature : (23.0 ± 3) °C
Pressure : (101.3 ± 3) kPa
Relative Humidity : (50.0 ± 20) %

Received Date : 17 MARCH 2023
Calibration Date : 27-28 MARCH 2023
Date of Issue : 31 MARCH 2023

Calibrated by : Nathakorn Pisutpaissan

Approved by :

(Thanakul Petchurai)

This certificate is issued in accordance with the requirements of ISO/IEC 17025 standard, may not be reproduced other than in full, except with the prior written approval of the head of Calibration Laboratory.

QF-TS12-04-04-020664

Continuation of Calibration Certificate

Cert. No. : ACL23106
Job No. : VC66AC0042
Pages : 2 of 8

Calibration Procedure : CP-AC-01

Calibration Method :

This equipment was calibrated by based on IEC-61672-3 (2013) Standard for sound level meter (SLM).
The SLM had tests to Acoustical and Electrical signal tests of frequency weighting with Anechoic chamber and Reference Standard Instruments.

For tests results of each items were made by observation of each Instruments display and also with SLM's display.

Condition of this result of calibration :

1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33210A	MY48017076	EF-0009-23	07-FEB-24
Waveform Generator	33511B	MY52302742	EF-0010-23	07-FEB-24
Digital Multimeter	33461A	MY53220104	EEL-BP 30/0266	13-FEB-24
Digital Multimeter	33461A	MY53220076	EEL-BP 29/0266	13-FEB-24
Digital Multimeter	34461A	MY60024273	EEL-BP 31/0266	14-FEB-24
Programmable Attenuator	MAT-1070	62100114	EF-0011-23	08-FEB-24
Condenser Microphone	4180	2977900	AA-1001-23	14-FEB-24
Measuring Amplifier	NA-42KAI	34560495	AA-3002-23	14-FEB-24

2. This result of calibration was found accurate as shown on date and place of calibration for this calibrated item only.

3. This certificate is traceable to the international system of unit maintained at :

- 3.1 National Institute of Metrology (Thailand).
- 3.2 Thailand Institute of Scientific and Technological Research (TISTR).

QF-TS12-04-04-020664

Continuation of Calibration Certificate

Cert. No. : ACL23106
Job No. : VC66AC0042
Pages : 3 of 8

Summary of Measurement Result :

Parameter	Pass	Fail	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1. Absolute sensitivity	✓	-	0.2	N/A
2. Self-generated noise	✓	-	0.2	N/A
3. Acoustical signal tests of frequency weightings				
125 Hz	✓	-	0.3	0.6
1000 Hz	✓	-	0.3	0.6
8000 Hz	✓	-	0.4	0.7
4. Electrical signal tests of frequency weightings				
For 10 Hz to 4 kHz	✓	-	0.3	0.6
For > 4 kHz to 10 kHz	✓	-	0.3	0.7
For > 10 kHz to 20 kHz	✓	-	0.3	1.0
5. Frequency and time weightings at 1 kHz	✓	-	0.2	0.2
6. Long-term stability	✓	-	0.1	0.1
7. Level linearity on the reference level range	✓	-	0.2	0.3
8. Level linearity including the level range control	✓	-	0.2	0.3
9. Tone burst response	✓	-	0.2	0.3
10. Peak C sound level	✓	-	0.2	0.35
11. Overload indication	✓	-	0.2	0.25
12. High level stability	✓	-	0.1	0.1

Note : Pass/Fail evaluation for each parameter, will be considered together from the acceptance limit and the Maximum-permitted uncertainty of measurement.

QF-TS12-04-04-020664

Continuation of Calibration Certificate

Cert. No. : ACL23106
Job No. : VC66AC0042
Pages : 4 of 8

Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.9 (93.98)	94.0	0.0	±0.3

2. Self-generated noise

2.1 Normal test

Measured Value (dB)
13.3

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

Frequency Weighting	Measured value (dB)
A - weight	8.7
C - weight	14.3
Flat	19.8

3. Acoustical signal tests of frequency weightings

Meter free-field acoustic response at a level of 84 dB

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
125	0.3	0.3	0.3	± 1.0
1000	0.2	0.2	0.2	± 0.7
8000	0.0	0.0	0.1	+ 1.5, - 2.5

QF-TS12-04-04-020664

Continuation of Calibration Certificate

Cert. No. : ACL23106
Job No. : VC66AC0042
Pages : 5 of 8

4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
63	0.0	0.0	0.0	±1.0
125	0.0	0.1	0.0	±1.0
250	0.0	0.0	0.0	±1.0
500	0.0	0.0	0.0	±1.0
1000	0.0	0.0	0.0	±1.0
2000	0.0	0.0	0.0	±1.0
4000	0.0	0.0	0.0	±1.0
8000	0.0	0.1	0.1	+ 1.5, - 2.5
16000	0.0	-1.2	-1.2	+ 2.5, -16.0

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

Frequency Weighting	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	94.0	94.0	0.0	± 0.2
C - weight	94.0	94.0	0.0	± 0.2
Flat	94.0	94.0	0.0	± 0.2

5.2 Time weighting at 1 kHz

Frequency Weighting	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	94.0	94.0	0.0	± 0.1
Slow	94.0	94.0	0.0	± 0.1
Leq	94.0	94.0	0.0	± 0.1

6. Long - term stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	94.0	94.0	0.0	± 0.1

QF-TS12-04-04-020664

Continuation of Calibration Certificate

Cert. No. : ACL23106
Job No. : VC66AC0042
Pages : 6 of 8

7. Level linearity on the reference level range

Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
137.0	137.0	0.0	±0.8
136.0	136.0	0.0	±0.8
135.0	135.0	0.0	±0.8
134.0	134.0	0.0	±0.8
133.0	133.0	0.0	±0.8
132.0	132.0	0.0	±0.8
131.0	131.0	0.0	±0.8
129.0	129.0	0.0	±0.8
124.0	124.0	0.0	±0.8
119.0	119.0	0.0	±0.8
114.0	114.0	0.0	±0.8
109.0	109.0	0.0	±0.8
104.0	104.0	0.0	±0.8
99.0	99.0	0.0	±0.8
94.0	94.0	0.0	±0.8
89.0	89.0	0.0	±0.8
84.0	84.0	0.0	±0.8
79.0	79.0	0.0	±0.8
74.0	74.1	0.1	±0.8
69.0	69.1	0.1	±0.8
64.0	64.0	0.0	±0.8
59.0	59.1	0.1	±0.8
54.0	54.0	0.0	±0.8
49.0	49.0	0.0	±0.8
44.0	44.0	0.0	±0.8
39.0	39.0	0.0	±0.8
34.0	34.0	0.0	±0.8
30.0	30.0	0.0	±0.8
29.0	29.0	0.0	±0.8
28.0	28.0	0.0	±0.8
27.0	27.0	0.0	±0.8
26.0	26.0	0.0	±0.8
25.0	24.9	-0.1	±0.8

QF-TS12-04-04-020664

Continuation of Calibration Certificate

Cert. No. : ACL23106
Job No. : VC66AC0042
Pages : 7 of 8

8. Level linearity including the level range control

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Auto	94.0	94.0	0.0	±0.8

9. Tone burst response

Time Weighting	Tone burst duration, Tb (ms)	Cycle	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	0.25	1	108.0	107.9	-0.1	1.5 ; -5.0
	2	8	117.0	117.0	0.0	1.0 ; -2.5
	200	800	134.0	134.0	0.0	±1.0
Slow	2	8	108.0	108.0	0.0	1.5 ; -5.0
	200	800	127.6	127.6	0.0	±1.0
SEL	0.25	1	99.0	98.9	-0.1	1.5 ; -5.0
	2	8	108.0	108.0	0.0	1.0 ; -2.5
	200	800	128.0	128.0	0.0	±1.0

10. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, L _{peak} (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	±2.0
One	136.4	135.6	-0.8	±2.0

Number of cycle in test signal	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	±1.0
Positive half cycle	135.4	135.2	-0.2	±1.0
Negative half cycle	135.4	135.2	-0.2	±1.0

QF-TS12-04-04-020664

Continuation of Calibration Certificate

Cert. No. : ACL23106
Job No. : VC66AC0042
Pages : 8 of 8

11. Overload indication

Measured value (dB)		Deviated Value (dB)	Acceptance Limits (dB)
Positive one-half cycle	Negative one-half cycle		
89.6	89.5	-0.1	±1.5

12. High level stability

Frequency	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Weighting				
A - weight	137.0	137.0	0.0	±0.1

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

End of Calibration Certificate

QF-TS12-04-04-020664



CALIBRATION CERTIFICATE

Issued Date : 16-Jul-2023

Certificate No. : 23TH3096

CSR No. : A095/04743

Page : 1 of 3

Customer : ALS Laboratory Group (Thailand) Co., Ltd.
114/1 Moo 8, Kamchanawanich Rd. Tambon, Ban Phru,
Amphoe Hat Yai, Songkhla, 90250Calibration Place : Chemical Laboratory
Instrument Name : incubator
Manufacturer : Memmert
Model : ICP750
Serial No. : F816.0063
ID No. : SGK_CL0028
Resolution : 0.1 °C
Received Date : 13-Jul-2023
Calibrated Date : 13-Jul-2023
Ambient Temperature : (30 ± 10) °C
Relative Humidity : (50 ± 30) %REVIEW BY Ananta B.
APPROVED BY Kamtha H.
NEXT CAL. DATE 13/01/25

Calibration Method Used :

This instrument was calibrated using the Calibration In - house method : SCAL WI.012 based on GLA - 20

The Southern Calibration Service Co., Ltd. calibration control system complies with requirement of ISO/IEC 17025:2017

Traceability of measurement :

This Certificate is traceable to the International and for national standards which realize the units of measurement according to the International System of Unit (SI) through :

- SCAL : Southern Calibration Service Co., Ltd.,

Calibrated by : Ibrohim Saleemin

Approved by :

Imron Rattanyum / Technical Manager

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 Southern Calibration Service Co., Ltd.

Certificate No. : 23TH3096
CSR No. : A095/04743
Page : 2 of 3

Details of Calibration

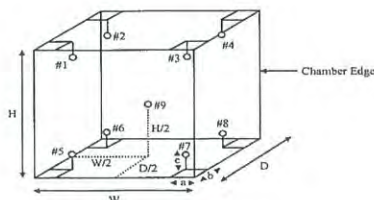
1. Reference Standard Equipment Used:

Equipment	Model	Serial No.	Cert. no.	Due Date
Date Acquisition/Switch Unit	34870A	MY58009813	23SDAT004	23-May-2024

2. The results reported in this certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the longterm stability of instrument.
3. This certificate is not certified any commercial transaction
4. Condition of item : normal condition , no indication for any damage or malfunction

Result of Calibration : (✓) Without Adjustment () After Adjustment

1. Sensor Installation Diagram



Sensor Installation Details

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

Dimension of the chamber

W = 40.0 cm
H = 40.0 cm
D = 33.0 cmCertificate No. : 23TH3096
CSR No. : A095/04743
Page : 3 of 3

Result of Calibration :

2. Temperature Measurement Accuracy Test

The measurement results of the Incubator and associates are reported in the manner as shown below

Cal point (°C)	Measured Standard Temperature At Spread Locations (°C)									Uncertainty (±°C)
	#1	#2	#3	#4	#5	#6	#7	#8	Ref. 9	
20	20.10	20.04	20.03	19.97	20.06	20.23	20.10	19.94	20.07	0.38

3. Performance Result

The performance of the incubator are reported as shown below

Cal point (°C)	UUC Setting (°C)	UUC Reading (°C)	Temperature Stability (±°C)	Temperature Uniformity (°C)	Overall Variation (°C)
20	20.0	20.0	0.14	0.17	0.32

- UUC = Unit Under Calibration

The report uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor $k = 2$, providing a level of confidence of approximately 95%

... End ...



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
5344 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250
TEL. 0-2717-3000-27 FAX. 0-2719-9484



Cert. No.: 22LM162
Page.: 1 of 2

Certificate of Calibration

Equipment : DO Meter with Sensor
Manufacturer : YSI
Model : 5000
Serial No. : 17B101473
ID No. : SGK_CL0073
Submitted by : ALS Laboratory Group (Thailand) Co., Ltd.
Songkhla Branch,
114/1 Moo 8, Kanjanavanij Rd., Banphru,
Location : TPA Chemistry Calibration Lab.2
Received Order : 18 November 2022
Calibrated Date : 21 November 2022
Ambient Temperature : (26 ± 10) °C
Relative Humidity : (50 ± 30) %
AC Line Voltage : (220 ± 22) V
Calibrated by : Warakorn Lergagtrakul

Approved by : Malee Bulkruea
Approved Signatory

() Ponthippa Tameyakul
(x) Malee Bulkruea
() Suwit Imjai

Issue Date : 22 November 2022

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.

A 0047729



Equipment : DO Meter with Sensor
Condition As-Received : Used Item
Reference : 2111-0663DSC-2
Procedure Used :-

Cert. No.: 22LM162
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	Model	Serial No.	Cert. No.	Due Date
1) Digital Thermometer	1523	3240076	221249	02 Mar 2023

2. This certificate is valid only to the item calibrated on date and place of calibration.
3. This certificate is traceable to the International System of Unit.

Result of Calibration :- () Without Adjustment

Function : Temperature measurement.

This instrument was connected with temperature sensor, S/N.: 17B100103

Calibration Point (°C)	Immersion Depth (mm)	Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	Uncertainty (± °C)	Coverage Factor k
20.00	60	20.001	19.88	-0.121	0.15	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 %.

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a 1136619



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
5344 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250
TEL. 0-2717-3000 FAX. 0-2719-9484

Cert.No.: 22TW259
Page.: 1 of 2

Certificate of Testing

Equipment : DO Meter
Manufacturer : YSI
Model : 5000
Serial No. : 17B101473
ID No. : SGK_CL0073
Received Date : 18 November 2022
Test Date : 21 November 2022
Reference : 2211-0663DSC-1
Submitted by : ALS Laboratory Group (Thailand) Co., Ltd.
Songkhla Branch,
114/1 Moo 8, Kanjanavanij Rd., Banphru,
Hatyai, Songkhla 90250, Thailand
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 : Malee Bulkruea
Approved Signatory

(x) Malee Bulkruea
() Sathip Meangmai
() Warakorn Lergagtrakul

Issue Date : 22 November 2022

B 0300950



Cert.No.: 22TW259
Page.: 2 of 2

Condition of this result of calibration

1. Reference Standard Instruments :

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

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

2. Standard Material :-

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

Result : Dissolved Oxygen Meter Adjustment With Air 100 %

Dissolved Oxygen Probe No.: 17B100103

Titration Method (Azide Modification Method) (mg/L)	DO Meter Reading (mg/L)	Standard Deviation (mg/L)
8.12	8.12	0.0045

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

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a 1136621

CALIBRATION CERTIFICATE

Issued Date : 1-May-2023

Certificate No. : 23CH0203

CSR No. : A088/04367

Page : 1 of 2

Customer : ALS Laboratory Group (Thailand) Co., Ltd.
114/1 Moo 8, Kamchanawanich Rd., Tambon, Ban Phru,
Amphoe Hat Yai, Songkhla, 90250

Calibration Place : Chemical Laboratory
Instrument Name : pH meter
Manufacturer : Mettler Toledo
Model : S220
Serial No. : B625631649
ID No. : SGK_CL0030
Electrode No. : 1204513
Received Date : 28-Apr-2023
Calibrated Date : 28-Apr-2023
Ambient Temperature : (25 ± 3) °C
Relative Humidity : (55 ± 15) %

REVIEW BY : Ananta B.
APPROVED BY : Kampha H.
NEXT CAL DATE : 29/10/2024

Calibration Method Used :

This instrument was calibrated using the Calibration in-house method : SCAL.WI.008 based on direct measurement by using certified reference Material (CRM)

The Southern Calibration Service Co., Ltd. calibration control system complies with requirement of ISO/IEC 17025:2017

Traceability of measurement :

This Certificate is traceable to the International and for national standards which realize the units of measurement according to the International System of Unit (SI) through :

- HACH : HACH LANGE GmbH - SCAL : Southern Calibration Service Co., Ltd.
- WK : WK Electric Co., Ltd.

Calibrated by : Aisara Ma

Approved by :

Imron Rattanyum / Technical Manager

The uncertainties are for a confidence probability of approximately 95%

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Certificate No. : 23CH0203

CSR No. : A088/04367

Page : 2 of 2

Details of Calibration

1. Reference Standard Equipment Used:

Equipment	Model	Serial No.	Cert. no.	Due Date
Standard Solution	4.005	C02954	1777	5-Sep-2024
Standard Solution	7.000	C03007	1767	17-Oct-2024
Standard Solution	10.012	C02953	1735	28-Apr-2024
Temperature/Electrical Calibrator	MC2-TE	14567	WK2105-299-223	5-Jun-2024
Digital Thermometer With Sensor	DP-77	1360896	22SDTH005	8-Aug-2023

2. The results reported in this certificate refer to the condition of the instrument on the date of calibration

and carry no implication regarding the longterm stability of instrument.

3. This certificate is not certified any commercial transaction

4. Condition of item : normal condition , no indication for any damage or malfunction

Result of Calibration :

1. Electrical Measurement

Applied Voltage (mV)	pH meter Reading		Correction (mV)	Uncertainty (± mV)
	(mV)	(pH)		
177.46	177.5	3.70	-0.02	0.17
0.00	0.0	6.70	0.00	0.13
-177.48	-177.4	9.80	-0.08	0.17

2. Before Sample Test Measurement

Standard Buffer Solutions (pH)	pH meter Reading		Correction (pH)	Uncertainty (± pH)
	(pH)	(mV)		
4.005	3.97	159.2	0.035	0.0090
6.999	6.96	-15.4	0.019	0.013
10.012	9.95	-168.0	0.062	0.036

3. After Sample Test Measurement

Standard Buffer Solutions (pH)	pH meter Reading		Correction (pH)	Uncertainty (± pH)
	(pH)	(mV)		
4.005	3.97	159.9	0.035	0.0090
6.999	7.01	-17.5	-0.011	0.013
10.012	9.98	-167.5	0.032	0.036

4. Temperature Measurement

Cal Point (°C)	Standard Temperature (°C)	UUC Reading (°C)	Correction (°C)	Uncertainty (± °C)
25	25.032	25.1	-0.068	0.11

The report uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor k = 2, providing a level of confidence of approximately 95%

... End ...

Sartorius (Thailand) Co., Ltd.
129 Rama 9 Road, Huaykwang, Huaykwang, Bangkok 10310
Tel: +66 2643 8361-6, e-mail: service.thailand@sartorius.com



NSC-TSI-TIS 17025
CALIBRATION 0428

SARTORIUS

REVIEW BY : Ananta B.
APPROVED BY : Kampha H.
NEXT CAL DATE : 25/10/24

Certificate of Calibration

Model Number : MSE224S-100-DU
Description : Analytical Balance
Serial Number : 0034705158
ID No. : SGK_CL0045
Manufacturer : Sartorius
Certificate No. : 23BCI0044
Issued Date : Friday, January 27, 2023
Reference No. : 202361
Page No. : 1 of 2

Customer Name : ALS Laboratory Group (Thailand) Co., Ltd.
Songkhla Branch: 114/1 Moo 8 Kamchanawanich Rd., Tan Ban Phru, A Hat Yai Songkhla 90250

Calibrated Place : Balance Room

Calibrated By : Mr. Chonchai Inthana
Calibration Date : Wednesday, January 25, 2023

Calibration Procedure No. : This calibration was conducted by Using in-house calibration procedure number (WI-003)
Based on UKAS LAB 14 : 2019

Metrological data :

Capacity : 220 g Readability : 0.0001 g

Ambients Conditions:

Temperature : 22.4 °C ± 3.0 °C
Humidity : 65.0 % RH ± 5.0 % RH
Pressure : ±

Reasons for calibration

☐ New Installation ☐ Service / Repaired ☒ Re-calibration/ Maintenance

Equipment Condition: ☒ Good Operate ☐ Fail

Measurement Method UKAS Publication Ref : Lab 14

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). The calibration certificate documents the traceability to National Standards, which realise the unit of measurement according to the International Standard System of Units (SI). Report of Tolerance came from list of Sartorius Metrological Specifications.

Traceability:

Model Number	Description	Traceability	Certificate No.	Due Date
YCS011-522-00	Sartorius weight set 1mg - 1kg E2 s/n 37829119	SPC-RT	C02212565	14-Sep-2023
MHB-382SD	Humidity/Barometer/Temp. Lutron MHB-382SD	DKSH	C19220444	5-Sep-2023

This certificate relate and apply this equipment only.
This certificate may not be reproduced other than in full except with the prior written approval of the Verification Operation Division
Sartorius (Thailand) Co., Ltd.

Mr. Chonchai Inthana (Technical Manager)



Sartorius (Thailand) Co., Ltd.
129 Rama 9 Road, Huaykwang, Huaykwang, Bangkok 10310
Tel: +66 2643 8361-6 Fax: +66 2643 8367

SARTORIUS

Certificate of Calibration

Model Number : MSE224S-100-DU
Description : Analytical Balance
Serial Number : 0034705158
ID No. : SGK_CL0045
Manufacturer : Sartorius
Certificate No. : 23BCI0044
Issued Date : Friday, January 27, 2023
Reference No. : 202361
Page No. : 2 of 2

Calibration Results : Without Adjustment

Repeatability	Excentricity (Off-center loading error)
The repeatability is the ability of a weighing instrument to display nearly identical readings under constant test conditions when the same load within a measurement series is placed repeatedly on the weighing pan in the same manner. The standard deviation is used to express repeatability quantitatively.	The off-center loading error is yielded by the difference between the reading of the load, i.e. 1/2 or 1/4 of maximum capacity, placed in the middle of the weighing pan and between each of four additional measurement points (positions defined according to OIML R110).
Nominal Value : (Low Load) 20 g Tolerance 0.0001 g	Nominal value : 50 g Tolerance 0.0004 g
Nominal Value : (High Load) 200 g Tolerance 0.0001 g	Difference
Standard Deviation 0.00003 0.00005	1 2 3 4 5 6

Linearity

The linearity, also called linearity error, describes the deviation of the characteristic curve of a weighing instrument from the linear slope.

Nominal Value (g)	Conventional Mass Value (g)	Displayed Value (g)	Deviation (g)	Uncertainty (g)
0.01	0.0100	0.0100	0.0000	0.00013
0.1	0.1000	0.1000	0.0000	0.00013
1	1.0000	1.0000	0.0000	0.00014
2	2.0000	2.0000	0.0000	0.00014
5	5.0000	5.0000	0.0000	0.00014
10	10.0000	10.0000	0.0000	0.00014
20	20.0000	20.0000	0.0000	0.00014
50	50.0000	50.0000	0.0000	0.00015
100	100.0000	100.0000	0.0000	0.00019
200	200.0000	200.0001	0.0001	0.00030

End of Report



Southern Calibration Service Co., Ltd.
669/35 Karnjanavanit Rd., Banpru, Hatyai, Songkla 90250 Thailand
Tel : 08 1599 0117 Fax : 0 7480 5133 Email : s.calibration@gmail.com www.scal-lab.com



CALIBRATION CERTIFICATE

Issued Date : 1-May-2023

Certificate No. : 23TH1728
CSR No. : A088/04367
Page : 1 of 3

Customer : ALS Laboratory Group (Thailand) Co., Ltd.
114/1 Moo 8, Kamchanwanich Rd. Tambon, Ban Phru,
Amphoe Hat Yai, Songkhla, 90250

Calibration Place : Chemical Laboratory
Instrument Name : Hot Air Oven
Manufacturer : Memmert
Model : UF110
Serial No. : B416.3387
ID No. : SGK_CL0024
Resolution : 0.1 °C
Received Date : 28-Apr-2023
Calibrated Date : 28-Apr-2023
Ambient Temperature : (30 ± 10) °C
Relative Humidity : (50 ± 30) %

REVIEW BY : Ananta B.
APPROVED BY : Kamitta H.
NEXT CAL. DATE : 28/01/2024

Calibration Method Used :

This instrument was calibrated using the Calibration In - house method : SCAL.WI.012 based on GLA - 20

The Southern Calibration Service Co., Ltd. calibration control system complies with requirement of ISO/IEC 17025:2017

Traceability of measurement :

This Certificate is traceable to the International and for national standards which realize the units of measurement according to the International System of Unit (SI) through :

- SCAL : Southern Calibration Service Co., Ltd.

Calibrated by : Ibrohim Saleemin

Approved by :

Imron Rattanyul / Technical Manager

The uncertainties are for a confidence probability of approximately 95%

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Certificate No. : 23TH1728
CSR No. : A088/04367
Page : 2 of 3

Details of Calibration

1. Reference Standard Equipment Used:

Equipment	Model	Serial No.	Cert. no.	Due Date
Data Acquisition/Switch Unit	34970A	MY56005613	22SDAT004	24-May-2023

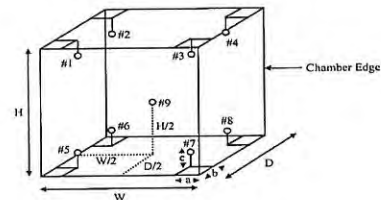
2. The results reported in this certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the longterm stability of instrument.

3. This certificate is not certified any commercial transaction

4. Condition of Item : normal condition, no indication for any damage or malfunction

Result of Calibration : (✓) Without Adjustment () After Adjustment

1. Sensor Installation Diagram



Sensor Installation Details

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

Dimension of the chamber

W = 40.0 cm
H = 40.0 cm
D = 35.0 cm



Certificate No. : 23TH1728
CSR No. : A088/04367
Page : 3 of 3

Result of Calibration :

2. Temperature Measurement Accuracy Test

The measurement results of the Hot Air Oven and associates are reported in the manner as shown below

Cal point (°C)	Measured Standard Temperature At Spread Locations (°C)									Uncertainty (±°C)
	#1	#2	#3	#4	#5	#6	#7	#8	Ref. 9	
40	40.48	40.28	40.28	39.91	40.17	40.09	39.93	40.27	39.89	0.36
70	70.35	70.23	70.58	69.74	69.99	69.92	69.86	70.13	70.04	0.36
103	103.19	103.12	103.46	103.37	103.10	103.54	103.43	103.05	103.40	0.35
104	104.31	104.23	104.52	103.77	104.12	104.08	103.90	104.20	104.55	0.35
105	105.07	105.03	105.48	105.27	105.12	105.01	105.01	105.00	104.96	0.35
180	180.31	180.00	180.00	180.07	180.18	180.05	180.01	180.10	180.24	0.41

3. Performance Result

The performance of the Hot Air Oven are reported as shown below

Cal point (°C)	UUC Setting (°C)	UUC Reading (°C)	Temperature Stability (±°C)	Temperature Uniformity (°C)	Overall Variation (°C)
40	40.0	40.0	0.20	0.70	0.72
70	70.0	70.0	0.20	0.60	0.94
103	103.0	103.0	0.20	0.43	0.54
104	104.0	104.0	0.10	0.79	0.88
105	105.0	105.0	0.10	0.59	0.69
180	180.0	180.0	0.10	0.38	0.38

- UUC = Unit Under Calibration

The report uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor k = 2, providing a level of confidence of approximately 95%

... End ...



Southern Calibration Service Co., Ltd.
669/35 Karnjanavanit Rd., Banpru, Hatyai, Songkla 90250 Thailand
Tel : 08 1599 0117 Fax : 0 7480 5133 Email : s.calibration@gmail.com www.scal-lab.com



CALIBRATION CERTIFICATE

Issued Date : 16-Jul-2023

Certificate No. : 23TH3097
CSR No. : A095/04743
Page : 1 of 3

Customer : ALS Laboratory Group (Thailand) Co., Ltd.
114/1 Moo 8, Kamchanwanich Rd. Tambon, Ban Phru,
Amphoe Hat Yai, Songkhla, 90250

Calibration Place : Chemical Laboratory
Instrument Name : Water Bath
Manufacturer : Memmert
Model : WNE29
Serial No. : L616.0538
ID No. : SGK_CL0035
Resolution : 0.1 °C
Received Date : 13-Jul-2023
Calibrated Date : 13-Jul-2023
Ambient Temperature : (30 ± 10) °C
Relative Humidity : (50 ± 30) %

REVIEW BY : Ananta B.
APPROVED BY : Kamitta H.
NEXT CAL. DATE : 13/01/25

Calibration Method Used :

This instrument was calibrated using the Calibration In - house method : SCAL.WI.014 based on ASTM E 715 : 1980 (reapproved 2001)

The Southern Calibration Service Co., Ltd. calibration control system complies with requirement of ISO/IEC 17025:2017

Traceability of measurement :

This Certificate is traceable to the International and for national standards which realize the units of measurement

according to the International System of Unit (SI) through :

- SCAL : Southern Calibration Service Co., Ltd.

Calibrated by : Ibrohim Saleemin

Approved by :

Imron Rattanyul / Technical Manager

The uncertainties are for a confidence probability of approximately 95%

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Certificate No. : 23TH3097
CSR No. : A095/04743
Page. : 2 of 3

Details of Calibration

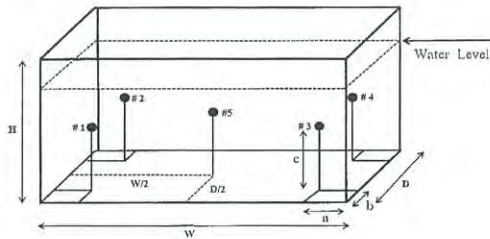
1. Reference Standard Equipment Used:

Equipment	Model	Serial No.	Cert. no.	Due Date
Data Acquisition/Switch Unit	3457DA	MY58009813	23SDAT004	23-May-2024

2. The results reported in this certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the longterm stability of instrument.
3. This certificate is not certified any commercial transaction
4. Condition of Item : normal condition , no indication for any damage or malfunction

Result of Calibration : (✓) Without Adjustment () After Adjustment

1. Sensor Installation Diagram



Sensor Installation Details

a = 5 cm
b = 5 cm
c = 5 cm

Dimension of the chamber

W = 45 cm
H = 30 cm
D = 35 cm



Certificate No. : 23TH3097
CSR No. : A095/04743
Page. : 3 of 3

Result of Calibration :

2. Temperature Measurement Accuracy Test

The measurement results of the Water Bath and associates are reported in the manner as shown below

Cal point (°C)	Measured Standard Temperature At Spread Locations (°C)					Uncertainty (±°C)
	#1	#2	#3	#4	Ref.5	
80	79.17	79.47	79.43	79.25	79.38	0.14

3. Performance Result

The performance of the Water Bath are reported as shown below

Cal point (°C)	UUC Setting (°C)	UUC Reading (°C)	Temperature Stability (±°C)	Temperature Uniformity (°C)	Overall Variation (°C)
80	80.0	80.0	0.24	0.38	0.38

- UUC = Unit Under Calibration

The report uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor k = 2, providing a level of confidence of approximately 95%

... End ...



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
534/4 PATTANASARN RD. SOI 19, SI ANSIL AND SE ANSIL BANGKOK 10250
TEL: 0-2717-3000-39 FAX: 0-2719-8884



Cert.No.: 23CH1013
Page.: 1 of 2

Certificate of Calibration

Equipment : Conductivity Meter
Manufacturer : Mettler Toledo
Model : SevenGo53
Serial No. : B914464504
ID No. : SGK_FS0051
Condition As-Received : Used Item
Received Date : 18 August 2023
Calibration Date : 21 August 2023
Reference : 2308-0583DSC-1
Submitted by : ALS Laboratory Group (Thailand) Co.,Ltd. Songkhla Branch
114/1 Moo 8 Kamchanawanich Rd., T.Ban Phru,
A.Hai Yai, Songkhla 90250 Thailand
Ambient Temperature : (25 ± 2.5) °C
Relative Humidity : (50 ± 15) %
Calibration Procedure : In-house method
- CP-CH6 : based on direct measurement by
using certified reference material (CRM)
Calibrated by : Walaiak Sinithean
Approved by :
(✓) Sathip Meangmai
() Warakorn Lemgagrakul
() Ponpan Paipim
Issue Date : 22 August 2023

The Uncertainties are for a confidence probability of approximately 95%

This certificate may not be reproduced without the prior written
Approval of the Head of Corporate Services 3: Equipment Calibration and Testing Services

A 0057345



Cert.No.: 23CH1013
Page.: 2 of 2

Condition of this result of calibration

1. Reference Standard Instrument :-
Instrument Serial No. ID No. Certificate No. Due date
1) Thermometer 1963878 130RC095 2211140 12 Sep 2023
- 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
84 000 µS/cm	CPA Chem	885120	28 Mar 2024
1413.0 µS/cm	CPA Chem	913596	14 July 2024
12 880 mS/cm	CPA Chem	885123	28 Mar 2024

- Control Conductivity calibration solution temperature by Water bath (25.0 ± 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 1413.0 µS/cm

Conductivity Electrode Serial No.: 5819080541

Standard Conductivity Solution	Before Adjustment UUC* Reading	After Adjustment UUC* Reading	Uncertainty of Measurement (±)	Coverage factor k
84 000 µS/cm	83.67 µS/cm	84.08 µS/cm	0.62 µS/cm	2.00
1413.0 µS/cm	1392 µS/cm	1413 µS/cm	9.2 µS/cm	2.00
12 880 mS/cm	12.54 mS/cm	12.74 mS/cm	0.086 mS/cm	2.00

Remark : - UUC* = Unit Under Calibration
- Cell constant = 0.546 cm⁻¹

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 %.

-00-

a 1176505



Internal Calibration

REVIEW BY	Somsak J.
APPROVED BY	Kamilla H.
NEXT CAL DATE	30/5/24

Equipment : Turbidity Meter Manufacture : HACH
ID No. : SGK_FSD046 Model : 2100Q/OIS
Calibrate Date : May30,2023 Serial No. : 19030C074494

Calibration Point	1st (NTU)	2nd (NTU)	3rd (NTU)	AVG (NTU)	Specifications	Evaluate
Standard 20 NTU	20.1	20.0	20.1	20.1	19 to 21 NTU	Pass
Standard 100 NTU	100.0	100.0	101.0	100.3	95 to 105 NTU	Pass
Standard 800 NTU	800.0	800.0	800.1	800.0	760 to 840 NTU	Pass

Calibrated by Somsak J. Approved by : Kamilla H.
(Scientist 2) (Section head)

Pe 14/02/23

HACH COMPANY



An ISO 9001 Certified Company

P.O.Box 389
Loveland, CO 80539
(970) 669-3050

Certificate of Analysis

This is a Component of 2659405-TH lot A2307

Page 1

COMMODITY:STABLCAL|sup|TS|sup0 FORMAZIN STANDARD 20 NTU
COMMODITY NUMBER: 2684801 MANUFACTURE DATE: 11/14/2022 DATE OF ANALYSIS: 11/18/2022
LOT NUMBER: A2304

TEST	SPECIFICATIONS	RESULTS
Turbidity	19 to 21 NTU	20.3 NTU

The expiration date is Feb 2024

Formazin and StablCal® solutions provided by Hach are not NIST traceable because the NIST does not carry turbidity standards. However, the use of Formazin and StablCal® as used in Hach method 8195 are accepted by the EPA as a primary standard to be used in the calibration of turbidity instruments.

Certified by Scott Als
Analytical Services Chemist

HACH COMPANY



An ISO 9001 Certified Company

P.O.Box 389
Loveland, CO 80539
(970) 669-3050

Certificate of Analysis

This is a Component of 2659405-TH lot A2307

Page 1

COMMODITY:STABLCAL|sup|TS|sup0 FORMAZIN STANDARD 100 NTU
COMMODITY NUMBER: 2684901 MANUFACTURE DATE: 11/10/2022 DATE OF ANALYSIS: 11/17/2022
LOT NUMBER: A2299

TEST	SPECIFICATIONS	RESULTS
Turbidity	95 to 105 NTU	102.0 NTU

The expiration date is Feb 2024

Formazin and StablCal® solutions provided by Hach are not NIST traceable because the NIST does not carry turbidity standards. However, the use of Formazin and StablCal® as used in Hach method 8195 are accepted by the EPA as a primary standard to be used in the calibration of turbidity instruments.

Certified by Scott Als
Analytical Services Chemist

HACH COMPANY



An ISO 9001 Certified Company

P.O.Box 389
Loveland, CO 80539
(970) 669-3050

Certificate of Analysis

This is a Component of 2659405-TH lot A2307

Page 1

COMMODITY:STABLCAL|sup|TS|sup0 FORMAZIN STANDARD 800 NTU
COMMODITY NUMBER: 2660501 MANUFACTURE DATE: 11/29/2022 DATE OF ANALYSIS: 12/5/2022
LOT NUMBER: A2318

TEST	SPECIFICATIONS	RESULTS
Turbidity	760 to 840 NTU	817.0 NTU

The expiration date is Feb 2024

Formazin and StablCal® solutions provided by Hach are not NIST traceable because the NIST does not carry turbidity standards. However, the use of Formazin and StablCal® as used in Hach method 8195 are accepted by the EPA as a primary standard to be used in the calibration of turbidity instruments.

Certified by Scott Als
Analytical Services Chemist



Southern Calibration Service Co., Ltd.

669/35 Kornjanavanit Rd., Banpru, Hatyai, Songkla 90250 Thailand
Tel: 08 1599 0417 Fax: 0 7480 5133 Email: s.calibration@gmail.com www.scal-lab.com



CALIBRATION CERTIFICATE

Issued Date : 8-Jan-2023

Certificate No. : 23TH0050

CSR No. : A047/02339

Page : 1 of 3

Customer : ALS Laboratory Group (Thailand) Co., Ltd.
114/1 Moo 8, Kamchanawanich Rd. Tambon, Ban Phru,
Amphoe Hat Yai, Songkhla, 90250

Calibration Place : Microbiological Laboratory
Instrument Name : Autoclave
Manufacturer : TOMY
Model : SX-700
Serial No. : 52134079
ID No. : SGK_ML0001
Resolution : 1 °C
Received Date : 5-Jan-2023
Calibrated Date : 5-Jan-2023
Ambient Temperature : (30 ± 10) °C
Relative Humidity : (50 ± 30) %

REVIEW BY : *Nathawut P.*
APPROVED BY : *Kanyarat H.*
NEXT CAL DATE : 05-May-2024

Calibration Method Used :

This instrument was calibrated using the Calibration in - house method : SCAL WI 16.013 based on BS 2646 : 1993 (part 5)

The Southern Calibration Service Co., Ltd. calibration control system complies with requirement of ISO/IEC 17025:2017

Traceability of measurement :

This Certificate is traceable to the International and for national standards which realize the units of measurement according to the International System of Unit (SI) through :

SCAL : Southern Calibration Service Co., Ltd.

Calibrated by : Ibrahim Saleemin

Approved by :

Kanyarat Chaipei / Technical Manager

The uncertainties are for a confidence probability of approximately 95%

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Certificate No. : 23TH0050

CSR No. : A047/02339

Page : 2 of 3

Details of Calibration

1 Reference Standard Equipment Used

Equipment	Model	Serial No.	Cert. no.	Due Date
Data logger With Sensor	GL220	C90432223	22SDAT005	4-May-2023

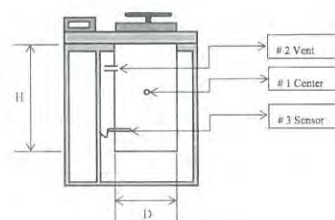
2 The results reported in this certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the longterm stability of instrument

3 This certificate is not certified any commercial transaction

4 Condition of item : normal condition , no indication for any damage or malfunction

Result of Calibration : (✓) Without Adjustment () After Adjustment

1 Sensor Installation Diagram



Chamber Diameter (D) : 30 cm

Chamber Height (H) : 70 cm



Certificate No. : 23TH0050

CSR No. : A047/02339

Page : 3 of 3

Result of Calibration :

2 Temperature Measurement Accuracy Test

The measurement results of the Autoclave and associates are reported in the manner as shown below

Cal point (°C)	Measured Standard Temperature At Spread Locations (°C)			Pressure Reading	Uncertainty (±°C)
	Center #1	Vent #2	Sensor #3		
115	115.5	115.4	115.5	0.07 MPa	0.76
118	116.7	116.5	116.1	0.06 MPa	0.76
121	122.0	122.1	122.1	0.11 MPa	0.76

3 Performance Result

The performance of the Autoclave are reported as shown below

Cal point (°C)	UUC Setting (°C)	UUC Reading (°C)	Temperature Stability (±°C)	Temperature Uniformity (°C)	Overall Variation (°C)
115	115	115	0.20	0.30	0.30
118	118	118	0.20	0.70	0.90
121	121	121	0.50	0.40	0.60

- Operating Time : 1800 65 sec

- UUC = Unit Under Calibration

The report uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor k = 2, providing a level of confidence of approximately 95%

.. End



Southern Calibration Service Co., Ltd.

669/35 Kornjanavanit Rd., Banpru, Hatyai, Songkla 90250 Thailand
Tel: 08 1599 0417 Fax: 0 7480 5133 Email: s.calibration@gmail.com www.scal-lab.com



CALIBRATION CERTIFICATE

Issued Date : 9-Aug-2022

Certificate No. : 22OV529

CSR No. : A037/01847

Page : 1 of 3

Customer : ALS Laboratory Group (Thailand) Co., Ltd.
114/1 Moo 8, Kamchanawanich Rd. Tambon, Ban Phru,
Amphoe Hat Yai, Songkhla, 90250

Calibration Place : Microbiological Laboratory
Instrument Name : Incubator
Manufacturer : Memmert
Model : ICP750
Serial No. : F816.0051
ID No. : SGK_ML0013
Resolution : 0.1 °C
Received Date : 6-Aug-2022
Calibrated Date : 6-Aug-2022
Ambient Temperature : (30 ± 10) °C
Relative Humidity : (50 ± 30) %

REVIEW BY : *Nathawut P.*
APPROVED BY : *Kanyarat H.*
NEXT CAL DATE : 06/01/2024

Calibration Method Used :

This instrument was calibrated using the Calibration in - house method : SCAL WI.012 based on G-20

The Southern Calibration Service Co., Ltd. calibration control system complies with requirement of ISO/IEC 17025:2017

Traceability of measurement :

This Certificate is traceable to the International and for national standards which realize the units of measurement according to the International System of Unit (SI) through :

SCAL : Southern Calibration Service Co., Ltd.

Calibrated by : Ibrahim Saleemin

Approved by :

Kanyarat Chaipei / Technical Manager

The uncertainties are for a confidence probability of approximately 95%

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Certificate No. : 22OV529

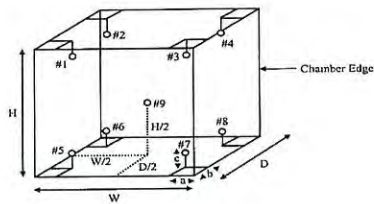
CSR No. : A037/01847

Page : 2 of 3

Details of Calibration**1. Reference Standard Equipment Used:**

Equipment	Model	Serial No.	Cert. no.	Due Date
Data Acquisition/Switch Unit	34970A	MY58009813	22SDAT004	24-May-2023

2. The results reported in this certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the long-term stability of instrument.
3. This certificate is not certified any commercial transaction
4. Condition of item : normal condition , no indication for any damage or malfunction

Result of Calibration : (✓) Without Adjustment () After Adjustment**1. Sensor Installation Diagram****Sensor Installation Details**

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

Dimension of the chamber

W = 104.0 cm
H = 120.0 cm
D = 60.0 cm



Certificate No. : 22OV529

CSR No. : A037/01847

Page : 3 of 3

Result of Calibration :**2. Temperature Measurement Accuracy Test**

The measurement results of the Incubator and associates are reported in the manner as shown below

Cal point (°C)	Measured Standard Temperature At Spread Locations (°C)								Uncertainty (±°C)
	#1	#2	#3	#4	#5	#6	#7	#8	
35	34.99	34.92	34.95	34.88	34.96	35.00	34.94	34.94	0.38

3. Performance Result

The performance of the incubator are reported as shown below

Cal point (°C)	UUC Setting (°C)	UUC Reading (°C)	Temperature Stability (±°C)	Temperature Uniformity (°C)	Overall Variation (°C)
35	35.0	35.0	0.10	0.12	0.19

- UUC = Unit Under Calibration

The report uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor k = 2,
providing a level of confidence of approximately 95%

... End ...

**Southern Calibration Service Co., Ltd.**

669/35 Kurnjanavon Rd., Banpru, Hatyai, Songkhla 90250 Thailand
Tel: 08-3599 0417 Fax: 0 7460 5131 Email: scalibration@gmail.com www.sscalab.com

**CALIBRATION CERTIFICATE**

Issued Date : 8-Jan-2023

Certificate No. : 23CH0016

CSR No. : A047/02339

Page : 1 of 2

Customer : ALS Laboratory Group (Thailand) Co., Ltd.
114/1 Moo 8, Kamchanawich Rd., Tambon, Ban Pru
Amphoe Hat Yai, Songkhla, 90250

Calibration Place : Microbiological Laboratory
Instrument Name : pH meter
Manufacturer : Sartorius
Model : Basic pH Meter PB-10
Serial No. : C70160695
ID No. : SGK_ML0016
Electrode No. : N/A
Received Date : 5-Jan-2023
Calibrated Date : 5-Jan-2023
Ambient Temperature : (25 ± 3) °C
Relative Humidity : (55 ± 15) %

REVIEW BY : [Signature]
APPROVED BY : [Signature]
NEXT CAL DATE : 05-May-24

Calibration Method Used :

This instrument was calibrated using the Calibration In-house method SCAL WI 008 based on direct measurement by using certified reference Material (CRM)

The Southern Calibration Service Co., Ltd. calibration control system complies with requirement of ISO/IEC 17025:2017

Traceability of measurement :

This Certificate is traceable to the International and for national standards which realize the units of measurement according to the International System of Unit (SI) through

- HACH HACH LANGE GmbH
- WK WK Electric Co., Ltd

Calibrated by : Jessadagon Lemhud

Approved by :

Kanyarat Chaiwet / Technical Manager

The uncertainties are for a confidence probability of approximately 95%

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Certificate No. : 23CH0016

CSR No. : A047/02339

Page : 2 of 2

Details of Calibration**1. Reference Standard Equipment Used**

Equipment	Model	Serial No.	Cert. no.	Due Date
Standard Solution	4 005	C02950	1733	22-Apr-2024
Standard Solution	7 000	C03001	1783	23-Sep-2024
Standard Solution	10 013	C02953	1735	29-Apr-2024
Temperature/Electrical Calibrator	MC2-TE	14987	WK2106-299-223	5-Jun-2024

2. The results reported in this certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the long-term stability of instrument.
3. This certificate is not certified any commercial transaction
4. Condition of item : normal condition no indication for any damage or malfunction

Result of Calibration : (✓) Without Adjustment () After Adjustment**1. Electrical Measurement**

Applied Voltage (mV)	pH meter Reading (mV)	Correction (mV)	Uncertainty (±mV)
-177.48	-177.4	0.08	0.17
0.00	0.0	0.00	0.13
-177.48	-177.4	-0.08	0.17

2. Sample Test Measurement

Standard Buffer Solutions (pH)	pH meter Reading (pH)	Correction (pH)	Uncertainty (±pH)
4.004	4.02	-0.016	0.011
7.000	7.01	-0.010	0.013
10.013	10.02	-0.007	0.036

The report uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor k = 2,
providing a level of confidence of approximately 95%

... End ...



Southern Calibration Service Co., Ltd.

669/35 Karnjanavanit Rd., Banphu, Hatyai, Songkhla 90250 Thailand
Tel : 08 1599 0117 Fax : 0 7480 5111 Email : s.calibrations@gmail.com www.scal-jab.com



CALIBRATION CERTIFICATE

Issued Date : 2-Feb-2023

Certificate No. : 23TH0521

CSR No. : A075/03704

Page : 1 of 3

Customer : ALS Laboratory Group (Thailand) Co., Ltd.
114/1 Moo 8, Kamchanawich Rd., Tambon, Ban Phru,
Amphoe Hat Yai, Songkhla, 90250

Calibration Place : Microbiological Laboratory
Instrument Name : Water Bath
Manufacturer : Memmert
Model : WPE45
Serial No. : L716.0558
ID No. : SGK_ML0021
Resolution : 0.1 °C
Received Date : 30-Jan-2023
Calibrated Date : 30-Jan-2023
Ambient Temperature : (30 ± 10) °C
Relative Humidity : (50 ± 30) %

REVIEW BY : *Intanavit P.*
APPROVED BY : *Kanika J.*
NEXT CAL. DATE : 30-Jul-24

Calibration Method Used :

This instrument was calibrated using the Calibration in-house method : SCAL.WI.014 based on ASTM E 715 : 1980 (reapproved 2001)

The Southern Calibration Service Co., Ltd. calibration control system complies with requirement of ISO/IEC 17025:2017

Traceability of measurement :

This Certificate is traceable to the International and for national standards which realize the units of measurement

according to the International System of Unit (SI) through :

- SCAL : Southern Calibration Service Co., Ltd.,

Calibrated by : Ibrahim Saleem

Approved by :

Innon Rattanyum / Technical Manager

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 Southern Calibration Service Co., Ltd.



Certificate No. : 23TH0521

CSR No. : A075/03704

Page : 2 of 3

Details of Calibration

1. Reference Standard Equipment Used:

Equipment	Model	Serial No.	Cert. no.	Due Date
Data Acquisition/Switch Unit	34970A	MY58009813	22SDAT004	24-May-2023

2. The results reported in this certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the long-term stability of instrument.

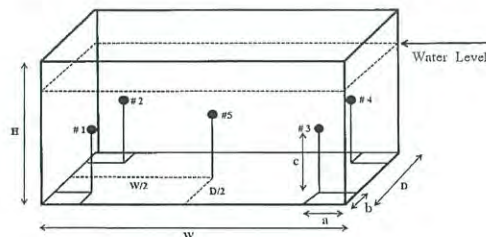
3. This certificate is not certified any commercial transaction

4. Condition of item : normal condition, no indication for any damage or malfunction

Result of Calibration :

(✓) Without Adjustment () After Adjustment

1. Sensor Installation Diagram



Sensor Installation Details

a = 5 cm
b = 5 cm
c = 5 cm

Dimension of the chamber

W = 45 cm
H = 30 cm
D = 35 cm



Certificate No. : 23TH0521

CSR No. : A075/03704

Page : 3 of 3

Result of Calibration :

2. Temperature Measurement Accuracy Test

The measurement results of the Water Bath and associates are reported in the manner as shown below

Cal point (°C)	Measured Standard Temperature At Spread Locations (°C)					Uncertainty (±°C)
	#1	#2	#3	#4	Ref.5	
44.5	44.47	44.48	44.45	44.51	44.50	0.14

3. Performance Result

The performance of the Water Bath are reported as shown below

Cal point (°C)	UUC Setting (°C)	UUC Reading (°C)	Temperature Stability (±°C)	Temperature Uniformity (°C)	Overall Variation (°C)
44.5	44.5	44.5	0.10	0.24	0.25

- UUC = Unit Under Calibration

The report uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor k = 2, providing a level of confidence of approximately 95%

... End ...



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



Cert.No.: 22CG3154

Page.: 1 of 2

Certificate of Calibration

Equipment : Burette
Capacity : 50 mL
Serial No. : -
ID. No. : BKK_EN0171
Manufacturer : Witeg
Made in : Germany
Submitted by : ALS Laboratory Group (Thailand) Co., Ltd.
104 Phatthanakan 40, Phatthanakan Rd.
Khaeng Phatthanakan, Khet Suan Luang
Bangkok 10250 Thailand
Ambient Temperature : (20 ± 2.5) °C
Relative Humidity : (50 ± 10) %
Barometric Pressure : 759 mmHg
Calibration Procedure : ASTM E 542 - 01
Calibrated by : Panward Pramkiam

REVIEW BY : *Sinluk P.*
APPROVED BY : *KAL*
NEXT CAL. DATE : 24/02/2024

Approved by :

Approved Signatory

() Pornthippa Tameyakul
() Malee Butkruea
(✓) Ponpan Paipim
() Srisuda Khamtha

Issue Date :

31 August 2022

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.

A 0044607



Equipment : Burette
 Received Date : 26 August 2022
 Condition As-Received : Used Item
 Calibration Date : 30 August 2022
 Reference : 2208-0918DSC-2

Cert.No.: 22CG3154
 Page: 2 of 2

Condition of this result of calibration

1. Reference Standard Instruments :

Instruments	Model	Serial No.	ID. No.	Certificate No.	Traceability	Due date
1) Balance	AE2005	N03679	140RC001	21MM429	NIMT	22 Sep 2022
2) Thermo-Hygraph	THDX-CE	00016540	140EC001	22H1243	NIST,NIMT	09 June 2023
3) Thermometer	-	1594592	140EC010	221181	NIMT	10 Feb 2023

This certification is traceable to SI Unit

- The certificate is valid only to the item calibrated on date and place of calibration.
- True value is converted to true volume at the standard temperature of 20 °C

Calibration result :

Nominal capacity (mL)	Reading (mL)	Uncertainty (± mL)	k Factor
50	49.9959	0.010	2.00

Remark mL = cm³

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 %.

-090-

1123908



Metrological Center

SCI ECO Services Company Limited

33/2 Moo 3, T.Banpa, A.Kaengkhloi, Saraburi 18110, Thailand.

Saraburi Tel : +66 3627 3096 Fax : +66 3627 3100
 Bangkok Tel : +668 9205 6851 , +669 8247 2380

Website : www.scieco.co.th E-Mail : calibrate@scg.co.th



Certificate No. T221644

Page 1 of 4

Certificate of Calibration

Equipment : Chamber (Cold Room)

Manufacturer : KOLDTECH

Model : KM 320

Serial No. : TBN-1012061/05

Customer Code : BKK_EN0167

ID No. : T2463A3

Customer : ALS Laboratory Group (Thailand) Co.,Ltd.

104 Phatthanakan 40, Phatthanakan Rd., Khwaeng Phatthanakan,
 Khet Suan Luang, Bangkok 10250

Customer Location : Environmental Laboratory

Date of Receipt : 27 June 2022

Calibrated By : Sujjar Nakkakred (Site Calibration Manager)

Approved By : / Boonchai Suriyawong (Site Calibration Manager)

Date of Issue : 04 JUL 2022

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 standard laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the Metrological Center.

FM-L14 117/01-02-64



Metrological Center

SCI ECO Services Company Limited

33/2 Moo 3, T.Banpa, A.Kaengkhloi, Saraburi 18110, Thailand.



Certificate No. T221644

Page 2 of 4

Calibration Report

Equipment : Chamber (Cold Room)
 Date of Calibration : 30 June - 1 July 2022
 Environment : Temperature : 18.9-23.7 °C
 Line Voltage : 222.9-226.5 V
 Relative Humidity : 55 - 65 %RH

Condition of this results of calibration :

- This equipment was calibrated by insert nine standard thermocouples type T into its chamber , the other one standard thermocouples type T use for ambient temperature measurement . The calibration was done in according to WI-T20 (based on ASTM E145-94 (Reapproved 2001) and AS2853-1986) . All data show below were final values and the initial data from customer request . The temperature scale used was based on ITS - 90 .

2. Reference Standard Instrument :

Instrument	Model	Instrument No.	Certificate No.	Due Date
TC	TYPE T	TN161-TN170	T210009	30 July 2022
TC	TYPE T	TN171-TN180	T210009	30 July 2022
DATA LOGGER	34970A	T149	T210009	30 July 2022

- This certificate is traceable to : National Institute of Metrology (Thailand) through Metrological Center (NSC-TISI-TIS 17025 CALIBRATION 0244)

4. Condition of calibrated item : good

Equipment Description :

Time Constant 3 Hour - Minute At 3 °C
 Fresh Air Damper ☐ Open ☐ Min ☐ Medium ☐ Max
☐ Close
☒ Not Available

5. Adjustment :

() without adjustment (X) after adjustment

Approved By

FM-L15 117/15-05-63



Metrological Center

SCI ECO Services Company Limited

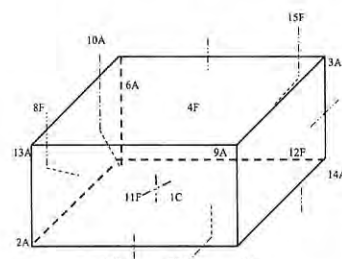
33/2 Moo 3, T.Banpa, A.Kaengkhloi, Saraburi 18110, Thailand.



Certificate No. T221644

Page 3 of 4

Calibration Report



C = Centre, F = Centre of Face, A = Corner, E = Centre of Edge

1C = TN161	11F = TN171
2A = TN162	12F = TN172
3A = TN163	13A = TN173
4F = TN164	14A = TN174
5A = TN165	15F = TN175
6A = TN166	16E = TN176
7F = TN167	
8F = TN168	
9A = TN169	
10A = TN170	

Approved By

FM-L15 117/15-05-63



Certificate No. T221644

Page 4 of 4

Calibration Report

Measurement Results:

Calibration Point	Average Standard Reading at each position (°C)									
	TN161	TN162	TN163	TN164	TN165	TN166	TN167	TN168	TN169	TN170
3	2.71	2.82	2.75	2.89	2.95	3.68	3.02	2.96	3.03	2.85
	TN171	TN172	TN173	TN174	TN175	TN176				
	2.97	3.02	2.89	3.04	2.97	3.33				

Chamber (Cold Room)		Temperature Distribution					
Setting (°C)	Reading (°C)		Average (°C)	Stability (±°C)	Uniformity (°C)	Uncertainty (±°C)	Coverage Factor k
	Min , Max	Average					
3.0	2.9 , 4.0	3.2	2.99	1.05	1.30	1.66	2.00

* The quoted uncertainty exclude " uniformity "

The calibration result apply only the above calibrated item.

The result of test was found accurate as shown on date and place of test only.

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k which for a t-distribution, providing a level of confidence of approximately 95 %

Approved By: _____

FM-LIS 117/15-05-63

BUN - E1120/9

REVIEW BY: Autcharawan S
APPROVED BY: Somrat M
NEXT CAL DATE: 12 Jan 24



Certificate of Calibration

ICS-2100: Anion (ID#659)

This certificate is to verify that instrument below are calibrated

by Archemica Lab Co., Ltd.

ICS-2100 S/N: 15010977

AS-HV S/N: 5450A36659

For

ALS Laboratory Group (Thailand) Co., Ltd.

Operator Signature: _____ Date: Jan 12, 2023

(Mr. Nutdanai Laekhwan)

Application Chemist



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
3344 PATTANAKARN ROAD SOI 18, SUANLIANG, SUANLIANG BANGKOK 10250
TEL: 0-2717-3000-27 FAX: 0-2719-9484



Cert. No.: 22LM162
Page.: 1 of 2

Certificate of Calibration

Equipment : DO Meter with Sensor
Manufacturer : YSI
Model : 5000
Serial No. : 17B101473
ID No. : SGK_CL0073
Submitted by : ALS Laboratory Group (Thailand) Co., Ltd.
Songkhla Branch,
114/1 Moo 8, Kanjanavanij Rd., Banphru,
Location : TPA Chemistry Calibration Lab.2
Received Order : 18 November 2022
Calibrated Date : 21 November 2022
Ambient Temperature : (26 ± 10) °C
Relative Humidity : (50 ± 30) %
AC Line Voltage : (220 ± 22) V
Calibrated by : Warakorn Lemgagrakul
Approved by : _____
() Pornthippa Tameyakul
(x) Malee Butkrusa
() Suwit Imjai
Issue Date : 22 November 2022

REVIEW BY: Aranta B
APPROVED BY: Kanitta H
NEXT CAL DATE: 21 Nov 24

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.

A 0047729



Equipment : DO Meter with Sensor
Condition As-Received : Used Item
Reference : 2111-0663DSC-2
Procedure Used :-

Cert. No.: 22LM162
Page.: 2 of 2

Calibration were conducted using in-house calibration procedure CP-0701 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	Model	Serial No.	Cert. No.	Due Date
1) Digital Thermometer	1523	3240076	221249	02 Mar 2023

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.

Result of Calibration :- (*) Without Adjustment

Function : Temperature measurement

This instrument was connected with temperature sensor, S/N: 17B100103

Calibration Point (°C)	Immersion Depth (mm)	Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	Uncertainty (±°C)	Coverage Factor k
20.00	60	20.001	19.88	-0.121	0.15	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-

a 1136619



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3 : EQUIPMENT CALIBRATION AND TESTING SERVICES
534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10259
TEL. 0-2717-3000 FAX. 0-2719-9484

Cert.No.: 22TW259
Page.: 1 of 2

Certificate of Testing

Equipment : DO Meter
Manufacturer : YSI
Model : 5000
Serial No. : 17B101473
ID No. : SGK_CL0073
Received Date : 18 November 2022
Test Date : 21 November 2022
Reference : 2211-0663DSC-1
Submitted by : ALS Laboratory Group (Thailand) Co., Ltd.
Songkhla Branch.
114/1 Moo 8, Kanjanavanij Rd., Banphru,
Hatyai, Songkhla 90250, Thailand
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 Sirilhean
Approved by :
Approved Signatory
(✓) Malee Butkruea
() Sathip Meangmai
() Warakorn Lerngagrakul
Issue Date : 22 November 2022

B 0300950



Cert.No.: 22TW259
Page.: 2 of 2

Condition of this result of calibration

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

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

2. Standard Material :-

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

Result : Dissolved Oxygen Meter Adjustment With Air 100 %
Dissolved Oxygen Probe No.: 17B100103

Titration Method (Azide Modification Method) (mg/L)	DO Meter Reading (mg/L)	Standard Deviation (mg/L)
8.12	8.12	0.0045

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

-000-

a 1136621



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3 : EQUIPMENT CALIBRATION AND TESTING SERVICES
534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10259
TEL. 0-2717-3000-29 FAX. 0-2719-9484

Cert. No.: 23TM74/1
Page.: 1 of 3

Certificate of Calibration

This Certificate was issued to replace to the Certificate No. 23TM74

Equipment : COD Reactor
Manufacturer : Hach
Model : DRB 200
Serial No. : 21120C1313
ID No. : SGK_CL0085
Submitted by : ALS Laboratory Group (Thailand) Co., Ltd. Songkhla Branch
114/1 Moo 8, Kanjanavanij Rd.,
Banphru, Hatyai,
Songkhla 90250, Thailand
Location : Chemistry Room
Received Order : 23 January 2023
Calibration Date : 23 - 24 January 2023
Ambient Temperature : (26 ± 10) °C
Relative Humidity : (50 ± 30) %
Calibrated by : Kunchit Promprat
Approved by :
Approved Signatory
() Ponthippa Tamoyakul
(✓) Malee Butkruea
() Suwit Imjai
Issue Date : 2 March 2023

REVIEW BY	Ananta B
APPROVED BY	Kanchana H
NEXT CAL DATE	23/1/24

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 Calibration and Testing Equipment Services.

A 0010625



Equipment : COD Reactor
Condition As-Received : Used Item
Reference : 2301-0861OC-4
Procedure Used :-

Cert. No.: 23TM74/1
Page.: 2 of 3

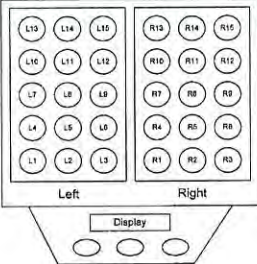
As agreed with customer the calibration was perform using in-house calibration method according to
directed measurement method with Data Acquisition which connected with Thermocouple Type T.
The temperature scale used was based on ITS-90.

Condition of this result of calibration

1. Reference standard instrument:-
Instrument Model Serial No. Cert. No. Due Date
1) Data Acquisition 34972A MY44073381 22LM78/1 12 May 2023

2. This certification is traceable to the SI unit.
3. This result of calibration was found accurate as shown on date and place of calibration only.
4. This certification is traceable to the International System of Unit.

Function of UUC* : Temperature Source
Heat transfer medium used : Alumina Calcined

Environment during calibration			Left		Right	
	Beginning	Finished	Position	ID No. of Sensor	Position	ID No. of Sensor
Temp.(°C)	28	28	L1	20-01TC-01	R1	20-01TC-01
REL.Humid.(%)	58	55	L2	20-01TC-02	R2	20-01TC-02
AC Supply (Volt)	225	225	L3	20-01TC-03	R3	20-01TC-03
						
			Left		Right	
			Display			
			Top View			
			L4	20-01TC-04	R4	20-01TC-04
			L5	20-01TC-05	R5	20-01TC-05
			L6	20-01TC-06	R6	20-01TC-06
			L7	20-01TC-07	R7	20-01TC-07
			L8	20-01TC-08	R8	20-01TC-08
			L9	20-01TC-09	R9	20-01TC-09
			L10	20-01TC-10	R10	20-01TC-10
			L11	20-01TC-01	R11	20-01TC-01
			L12	20-01TC-02	R12	20-01TC-02
			L13	20-01TC-03	R13	20-01TC-03
			L14	20-01TC-04	R14	20-01TC-04
			L15	20-01TC-05	R15	20-01TC-05

Malee

a 1149780



Equipment : COD Reactor
Condition As-Received : Used Item
Reference : 2301-06610C-4
Result of Calibration : (*) Without Adjustment
Function of UUC* : Temperature Source

Cert. No.: 23TM74/1
Page.: 3 of 3

Calibration Point		150 °C						Temperature stability (± °C)	Uncertainty (± °C)	Coverage Factor k
UUC* Setting (°C)	UUC* Reading (°C)	Measured Temperature (°C)								
		Position								
Left	150	Left			Right			Left	0.59	2
		L13	L14	L15	R13	R14	R15			
		148.290	148.623	148.360	149.812	150.003	149.566			
		L10	L11	L12	R10	R11	R12			
		148.929	148.812	149.120	150.357	149.814	149.593			
Right	152	L7	L8	L9	R7	R8	R9	Right	0.10	
		149.534	149.895	150.362	151.629	151.699	151.581			
		L4	L5	L6	R4	R5	R6			
		149.999	149.972	149.971	151.721	151.690	151.682			
		L1	L2	L3	R1	R2	R3			
149.639	149.855	149.415	151.444	151.419	150.728					

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.

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 %.

-o0o-

Malu

a 1149779



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
534/4 PATTANAKARN ROAD SOI 15, SUANLUANG, SUANLUANG BANGKOK 10250
TEL. 0-2717-3000-29 FAX. 0-2719-9484



Cert.No.: 23CHO30
Page.: 1 of 3

Certificate of Calibration

Equipment : Spectrophotometer
Manufacturer : HACH
Model : DR 3900
Serial No. : 1687645
ID No. : SGK_CL0038
Condition As-Received : Used Item
Received Date : 23 January 2023
Calibration Date : 24 January 2023
Reference : 2301-06610C-1
Submitted by : ALS Laboratory Group (Thailand) Co., Ltd. Songkhla Branch,
114/1 Moo 8, Kanjanavanij Rd.,
Banphru, Halyai,
Songkhla 90250, Thailand

Calibration Place : Chemistry Room
Ambient Temperature : (28.3 - 27.3) °C (On-Site)
Relative Humidity : (49.6 - 49.9) % (On-Site)
Calibration Procedure : In-house method :
CP-0CH4 based on ASTM E 275-01

Calibrated by : Kunchit Promprat

Approved by : Malu
Approved Signatory

() Malee Butkruea
() Sathip Meangmai
() Warakorn Leingagtrakul

Issue Date : 7 February 2023
The Uncertainties are for a confidence probability of approximately 95%

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

A 0050506



Cert. No.: 23CHO30
Page.: 2 of 3

Condition of calibration result

1. Reference Standard Material :

Material	Serial No.	Certificate No.	Due date
1. Absorbance Standard set	32593	100581	30 Mar 2024
2. Wavelength Standard set	29829	94776	02 Sep 2023
3. Wavelength Standard set	29829	94777	02 Sep 2023

2. This certificate is valid only to the item calibrated on date and place of calibration.
3. This certificate is traceable to the International System of Unit maintained at :
- National Physical Laboratory (NPL), The United Kingdom of Great Britain and Northern Ireland
- National Institute of Standards and Technology (NIST), The United States of America

4. Spectral Bandwidth : 5 nm
Scan Speed : - nm/min

Calibration Results : without adjustment

Wavelength Accuracy

Certified Values of Reference Material (nm)	UUC Reading (nm)	Uncertainty of Measurement (± nm)	Coverage Factor k
418.40	418	0.59	2.00
479.88	480	0.59	2.00
513.75	514	0.59	2.00
537.00	536	0.59	2.00
638.00	638	0.59	2.00
684.70	685	0.59	2.00
747.61	748	0.59	2.00
807.04	807	0.59	2.00



Cert. No.: 23CHO30
Page.: 3 of 3

Calibration Results : without adjustment

Photometric Accuracy

Wavelength (nm)	Certified Values of Reference Material (Abs)	UUC Reading (Abs)	Uncertainty of Measurement (± Abs)	Coverage Factor k
420.0	Zero	0.000	0.0028	2.00
	0.5701	0.568	0.0029	2.00
	0.7147	0.712	0.0030	2.00
	1.0031	0.999	0.0030	2.00
440.0	Zero	0.000	0.0028	2.00
	0.6552	0.653	0.0029	2.00
	0.7031	0.700	0.0030	2.00
	0.9867	0.981	0.0029	2.00
465.0	Zero	0.000	0.0028	2.00
	0.5178	0.517	0.0030	2.00
	0.6642	0.663	0.0029	2.00
	0.9312	0.930	0.0030	2.00
545.1	Zero	0.000	0.0028	2.00
	0.5195	0.517	0.0030	2.00
	0.7007	0.698	0.0029	2.00
	0.9833	0.979	0.0028	2.00
590.0	Zero	0.000	0.0028	2.00
	0.5537	0.550	0.0030	2.00
	0.7763	0.771	0.0029	2.00
	1.0912	1.083	0.0028	2.00
635.0	Zero	0.000	0.0028	2.00
	0.5815	0.558	0.0029	2.00
	0.7659	0.762	0.0030	2.00
	1.0763	1.070	0.0028	2.00

Remark

- Each individual filter is measured against the empty filter holder (blank) used to zero the spectrophotometer

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-

Malu

a 1146845



Southern Calibration Service Co., Ltd.

669/35 Karnjanavanich Rd., Bangpra, Hatyai, Songkla 90250 Thailand
Tel : 08 1599 0417 Fax : 0 7480 5133 Email : s.calibration@gmail.com www.scal-lab.com



CALIBRATION CERTIFICATE

Issued Date : 1-May-2023

Certificate No. : 23CH0203

CSR No. : A088/04367

Page : 1 of 2

Customer : ALS Laboratory Group (Thailand) Co., Ltd.
114/1 Moo 8, Karnchanawanich Rd., Tambon, Ban Phru,
Amphoe Hat Yai, Songkhla, 90250

Calibration Place : Chemical Laboratory
Instrument Name : pH meter
Manufacturer : Mettler Toledo
Model : S220
Serial No. : B625631849
ID No. : SGK_CL0030
Electrode No. : 1204613
Received Date : 28-Apr-2023
Calibrated Date : 28-Apr-2023
Ambient Temperature : (25 ± 3) °C
Relative Humidity : (55 ± 15) %

REVIEW BY : Ananta B.
APPROVED BY : Yantha H.
NEXT CAL. DATE : 11/11/2024

Calibration Method Used :

This instrument was calibrated using the Calibration In - house method : SCAL.WI.008 based on direct measurement by using certified reference Material (CRM)

The Southern Calibration Service Co., Ltd. calibration control system complies with requirement of ISO/IEC 17025:2017

Traceability of measurement :

This Certificate is traceable to the international and/or national standards which realize the units of measurement according to the International System of Unit (SI) through :

- HACH : HACH LANGE GmbH

- SCL : Southern Calibration Service Co., Ltd.

- WK : WK Electric Co., Ltd.

Calibrated by : Aisara Ma

Approved by :

Imron Rattanasayum / Technical Manager

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 Southern Calibration Service Co., Ltd.



Certificate No. : 23CH0203

CSR No. : A088/04367

Page : 2 of 2

Details of Calibration

1. Reference Standard Equipment Used:

Equipment	Model	Serial No.	Cert. no.	Due Date
Standard Solution	4.005	C02994	1777	5-Sep-2024
Standard Solution	7.000	C03007	1787	17-Oct-2024
Standard Solution	10.012	C02953	1735	29-Apr-2024
Temperature/Electrical Calibrator	MC2-TE	14987	WK2105-299-223	5-Jun-2024
Digital Thermometer With Sensor	DP-77	1.360896	22SDTH005	8-Aug-2023

2. The results reported in this certificate refer to the condition of the instrument on the date of calibration

and carry no implication regarding the longterm stability of instrument.

3. This certificate is not certified any commercial transaction

4. Condition of Item : normal condition , no indication for any damage or malfunction.

Result of Calibration :

1. Electrical Measurement

Applied Voltage (mV)	pH meter Reading		Correction (mV)	Uncertainty (± mV)
	(mV)	(pH)		
177.48	177.5	3.70	-0.02	0.17
0.00	0.0	6.70	0.00	0.13
-177.48	-177.4	9.80	-0.08	0.17

2. Before Sample Test Measurement

Standard Buffer Solutions (pH)	pH meter Reading		Correction (pH)	Uncertainty (± pH)
	(pH)	(mV)		
4.005	3.97	159.2	0.035	0.0090
6.999	6.98	-15.4	0.019	0.013
10.012	9.95	-188.0	0.062	0.036

3. After Sample Test Measurement

Standard Buffer Solutions (pH)	pH meter Reading		Correction (pH)	Uncertainty (± pH)
	(pH)	(mV)		
4.005	3.97	158.9	0.035	0.0090
6.999	7.01	-17.5	-0.011	0.013
10.012	9.98	-187.5	0.032	0.036

4. Temperature Measurement

Cal Point (°C)	Standard Temperature (°C)	UUC Reading (°C)	Correction (°C)	Uncertainty (± °C)
25	25.032	25.1	-0.068	0.11

The report uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor k = 2,
providing a level of confidence of approximately 95%

... End ...

ภาคผนวก จ

สำเนาหนังสืออนุญาตขึ้นทะเบียน

ห้องปฏิบัติการวิเคราะห์

ผู้อำนวยการศูนย์พัฒนาการเรียนการสอน วิทยาลัยการเกษตรและเทคโนโลยีสุราษฎร์ธานี

๗๒) นายสมบุญ บุตรจันทร์	ทะเบียนเลขที่ ๖-๒๐๔-๖-๗๕๓๔
๗๓) นายวิรัตน์ โยชนะรา	ทะเบียนเลขที่ ๖-๒๐๔-๖-๗๕๓๕
๗๔) นายอนุพงศ์ เหมขุน	ทะเบียนเลขที่ ๖-๒๐๔-๖-๗๕๓๖
๗๕) นายจิรภูมิ ขวัญอ้อ	ทะเบียนเลขที่ ๖-๒๐๔-๖-๗๕๓๗
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๗๘) นายณัฐนันท์ ปานประเสริฐ	ทะเบียนเลขที่ ๖-๒๐๔-๖-๗๕๔๐
๗๙) นายอัคริณ จ้อสาว	ทะเบียนเลขที่ ๖-๒๐๔-๖-๗๕๔๑
๘๐) นายประเสริฐ สุระชัย	ทะเบียนเลขที่ ๖-๒๐๔-๖-๗๕๔๒
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๘๘) นายภาณุพงศ์ โสมวงศ์	ทะเบียนเลขที่ ๖-๒๐๔-๖-๗๕๕๐
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๙๐) นายณัฐชัย โกศลวิมาน	ทะเบียนเลขที่ ๖-๒๐๔-๖-๗๕๕๒
๙๑) นายณัฐวุฒิ ศรีประเสริฐ	ทะเบียนเลขที่ ๖-๒๐๔-๖-๗๕๕๓
๙๒) นายจักรวิชัย นาคพนม	ทะเบียนเลขที่ ๖-๒๐๔-๖-๗๕๕๔
๙๓) นายพชรชัย ชัยทิพย์	ทะเบียนเลขที่ ๖-๒๐๔-๖-๗๕๕๕
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๙๖) นายอนันต์ อื่นสุตา	ทะเบียนเลขที่ ๖-๒๐๔-๖-๗๕๕๘
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๙๘) นางสาวพิมพ์วิมล มีนาถ	ทะเบียนเลขที่ ๖-๒๐๔-๖-๗๕๖๐
๙๙) นางสาวพรพรรณ สิงห์สมบูรณ์	ทะเบียนเลขที่ ๖-๒๐๔-๖-๗๕๖๑
๑๐๐) นางสาวชญาณีน พรหมจันทร์	ทะเบียนเลขที่ ๖-๒๐๔-๖-๗๕๖๒
๑๐๑) นายกริณี ทวีราช	ทะเบียนเลขที่ ๖-๒๐๔-๖-๗๕๖๓
๑๐๒) นายจักริน หมั่นวิชา	ทะเบียนเลขที่ ๖-๒๐๔-๖-๗๕๖๔
๑๐๓) นายณัฏฐ์ สุขเปี้ย	ทะเบียนเลขที่ ๖-๒๐๔-๖-๗๕๖๕
๑๐๔) นายอนันต์ ต๊ะทองคำ	ทะเบียนเลขที่ ๖-๒๐๔-๖-๗๕๖๖
๑๐๕) นายอุทัย สมนอก	ทะเบียนเลขที่ ๖-๒๐๔-๖-๗๕๖๗
๑๐๖) นายทักษิณย์ อุบลศรี	ทะเบียนเลขที่ ๖-๒๐๔-๖-๗๕๖๘
๑๐๗) นายณัฏฐ์ นามะบุญญา	ทะเบียนเลขที่ ๖-๒๐๔-๖-๗๕๖๙
๑๐๘) นายอัคริณ บัวแดง	ทะเบียนเลขที่ ๖-๒๐๔-๖-๗๕๗๐

(นายศิระ จันทร์เกิด)

นักวิทยาศาสตร์ชำนาญการพิเศษ วิทยาการพิษวิทยา
ผู้อำนวยการกองวิจัยและพัฒนาระบบสิ่งแวดล้อม
กรมวิทยาศาสตร์สิ่งแวดล้อม กระทรวงสาธารณสุข

๑๐๙) นายณณชัย...

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๑๑๐) นายณัฐพล คุณสุทธิ	ทะเบียนเลขที่ ๖-๒๐๔-๖-๗๕๗๒
๑๑๑) นายณัฏฐ์ จันทร์	ทะเบียนเลขที่ ๖-๒๐๔-๖-๗๕๗๓
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๑๑๓) นายพชรชัย โสมเชื้อ	ทะเบียนเลขที่ ๖-๒๐๔-๖-๗๕๗๕
๑๑๔) นายพิรพัฒน์ กำคำ	ทะเบียนเลขที่ ๖-๒๐๔-๖-๗๕๗๖
๑๑๕) นายภาณุพงศ์ นามชัย	ทะเบียนเลขที่ ๖-๒๐๔-๖-๗๕๗๗
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๑๓๙) นายณัฏฐ์ พงษ์ศิริ	ทะเบียนเลขที่ ๖-๒๐๔-๖-๗๖๐๑
๑๔๐) นายณัฏฐ์ พงษ์ศิริ	ทะเบียนเลขที่ ๖-๒๐๔-๖-๗๖๐๒
๑๔๑) นายณัฏฐ์ พงษ์ศิริ	ทะเบียนเลขที่ ๖-๒๐๔-๖-๗๖๐๓
๑๔๒) นายณัฏฐ์ พงษ์ศิริ	ทะเบียนเลขที่ ๖-๒๐๔-๖-๗๖๐๔
๑๔๓) นายณัฏฐ์ พงษ์ศิริ	ทะเบียนเลขที่ ๖-๒๐๔-๖-๗๖๐๕
๑๔๔) นายณัฏฐ์ พงษ์ศิริ	ทะเบียนเลขที่ ๖-๒๐๔-๖-๗๖๐๖
๑๔๕) นายณัฏฐ์ พงษ์ศิริ	ทะเบียนเลขที่ ๖-๒๐๔-๖-๗๖๐๗
๑๔๖) นายณัฏฐ์ พงษ์ศิริ	ทะเบียนเลขที่ ๖-๒๐๔-๖-๗๖๐๘
๑๔๗) นายณัฏฐ์ พงษ์ศิริ	ทะเบียนเลขที่ ๖-๒๐๔-๖-๗๖๐๙
๑๔๘) นายณัฏฐ์ พงษ์ศิริ	ทะเบียนเลขที่ ๖-๒๐๔-๖-๗๖๑๐
๑๔๙) นายณัฏฐ์ พงษ์ศิริ	ทะเบียนเลขที่ ๖-๒๐๔-๖-๗๖๑๑
๑๕๐) นายณัฏฐ์ พงษ์ศิริ	ทะเบียนเลขที่ ๖-๒๐๔-๖-๗๖๑๒
๑๕๑) นายณัฏฐ์ พงษ์ศิริ	ทะเบียนเลขที่ ๖-๒๐๔-๖-๗๖๑๓
๑๕๒) นายณัฏฐ์ พงษ์ศิริ	ทะเบียนเลขที่ ๖-๒๐๔-๖-๗๖๑๔
๑๕๓) นายณัฏฐ์ พงษ์ศิริ	ทะเบียนเลขที่ ๖-๒๐๔-๖-๗๖๑๕
๑๕๔) นายณัฏฐ์ พงษ์ศิริ	ทะเบียนเลขที่ ๖-๒๐๔-๖-๗๖๑๖
๑๕๕) นายณัฏฐ์ พงษ์ศิริ	ทะเบียนเลขที่ ๖-๒๐๔-๖-๗๖๑๗
๑๕๖) นายณัฏฐ์ พงษ์ศิริ	ทะเบียนเลขที่ ๖-๒๐๔-๖-๗๖๑๘
๑๕๗) นายณัฏฐ์ พงษ์ศิริ	ทะเบียนเลขที่ ๖-๒๐๔-๖-๗๖๑๙
๑๕๘) นายณัฏฐ์ พงษ์ศิริ	ทะเบียนเลขที่ ๖-๒๐๔-๖-๗๖๒๐
๑๕๙) นายณัฏฐ์ พงษ์ศิริ	ทะเบียนเลขที่ ๖-๒๐๔-๖-๗๖๒๑
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๑๖๑) นายณัฏฐ์ พงษ์ศิริ	ทะเบียนเลขที่ ๖-๒๐๔-๖-๗๖๒๓
๑๖๒) นายณัฏฐ์ พงษ์ศิริ	ทะเบียนเลขที่ ๖-๒๐๔-๖-๗๖๒๔

(นายศิระ จันทร์เกิด)

นักวิทยาศาสตร์ชำนาญการพิเศษ วิทยาการพิษวิทยา
ผู้อำนวยการกองวิจัยและพัฒนาระบบสิ่งแวดล้อม
กรมวิทยาศาสตร์สิ่งแวดล้อม กระทรวงสาธารณสุข

๑๖๓) นางสาวจุฑามณี...

๑๖๓) นางสาวจุฑามณี สุนทรสนาน	ทะเบียนเลขที่ ๖-๒๐๔-๖-๗๖๒๕
๑๖๔) นางสาวจุฑามณี สุนทรสนาน	ทะเบียนเลขที่ ๖-๒๐๔-๖-๗๖๒๖
๑๖๕) นางสาวจุฑามณี สุนทรสนาน	ทะเบียนเลขที่ ๖-๒๐๔-๖-๗๖๒๗
๑๖๖) นางสาวจุฑามณี สุนทรสนาน	ทะเบียนเลขที่ ๖-๒๐๔-๖-๗๖๒๘
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๑๘๓) นางสาวจุฑามณี สุนทรสนาน	ทะเบียนเลขที่ ๖-๒๐๔-๖-๗๖๔๕
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๑๘๙) นางสาวจุฑามณี สุนทรสนาน	ทะเบียนเลขที่ ๖-๒๐๔-๖-๗๖๕๑
๑๙๐) นางสาวจุฑามณี สุนทรสนาน	ทะเบียนเลขที่ ๖-๒๐๔-๖-๗๖๕๒

(นายศิระ จันทร์เกิด)

นักวิทยาศาสตร์ชำนาญการพิเศษ วิทยาการพิษวิทยา
ผู้อำนวยการกองวิจัยและพัฒนาระบบสิ่งแวดล้อม
กรมวิทยาศาสตร์สิ่งแวดล้อม กระทรวงสาธารณสุข

เอกสารแนบท้ายหนังสือรับต่ออายุขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน
บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด เลขทะเบียน ๖-๒๐๔
ที่ อก ๐๓๐๑(๑)/ ๑๐๖๕ ลงวันที่ ๒๕ มกราคม ๒๕๖๕
ขอขยายสารเคมีที่ได้รับขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๑๖๖ รายการ

น้ำเสีย จำนวน 59 รายการ

ลำดับที่	สารเคมี	วิธีวิเคราะห์
1	Aldicarb	High-Performance Liquid Chromatographic Method ⁽⁴⁾
2	Aldicarb Sulfone	High-Performance Liquid Chromatographic Method ⁽⁴⁾
3	Aldicarb Sulfoxide	High-Performance Liquid Chromatographic Method ⁽⁴⁾
4	Aldrin	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
5	Arsenic	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
6	Barium	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
7	α-BHC	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
8	β-BHC	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
9	δ-BHC	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
10	γ-BHC	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
11	Biochemical Oxygen Demand	1) 5-Day BOD Test, Azide Modification Method ⁽⁴⁾ 2) 5-Day BOD Test, Membrane Electrode Method ⁽⁴⁾
12	Carbaryl	High-Performance Liquid Chromatographic Method ⁽⁴⁾
13	Carbofuran	High-Performance Liquid Chromatographic Method ⁽⁴⁾
14	Cadmium	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
15	Chemical Oxygen Demand	1) Closed Reflux, Colorimetric Method ⁽⁴⁾ 2) Closed Reflux, Titrmetric Method ⁽⁴⁾
16	Chlordane	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
17	Chromium	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
18	Color	ADMI Weighted-Ordinate Spectrophotometric Method

(นางจิราภรณ์ อัครกุลวิไล)
ผู้อำนวยการกลุ่มมาตรฐานวิชาการ/หัวหน้าห้องปฏิบัติการ
และทะเบียนห้องปฏิบัติการ

19 Copper...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
19	Copper	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
20	Cyanide	Distillation, Colorimetric Method ⁽⁴⁾
21	2,4'-DDD	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
22	4,4'-DDD	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
23	2,4'-DDE	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
24	4,4'-DDE	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
25	2,4'-DDT	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
26	4,4'-DDT	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
27	Dieldrin	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
28	Endosulfan Sulfate	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
29	Endosulfan I	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
30	Endosulfan II	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
31	Endrin	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
32	Endrin Aldehyde	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
33	Formaldehyde	Distillation, Colorimetric Method ⁽⁴⁾
34	Free Chlorine	1) DPD Ferrous Titrimetric Method ⁽⁴⁾ 2) Iodometric Method ⁽⁴⁾
35	Heptachlor	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
36	Heptachlor epoxide	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
37	Hexavalent Chromium	Filtration, Colorimetric Method ⁽⁴⁾
38	3-Hydroxycarbofuran	High-Performance Liquid Chromatographic Method ⁽⁴⁾
39	Lead	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
40	Manganese	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
41	Mercury	1) Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/Mass spectrometric Method ⁽⁴⁾
42	Methiocarb	High-Performance Liquid Chromatographic Method ⁽⁴⁾
43	Methoxychlor	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾

วิธีวิเคราะห์
(นางจิรภาณุพันธ์ อัครสกุลวิไล)
ผู้อำนวยการศูนย์มาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษ
กรมควบคุมมลพิษ

44 Methomyl...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
44	Methomyl	High-Performance Liquid Chromatographic Method ⁽⁴⁾
45	Nickel	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
46	Oil & Grease	1) Liquid-Liquid, Partition-Gravimetric Method ⁽⁴⁾ 2) Soxhlet Extraction Method ⁽⁴⁾
47	Oxamyl	High-Performance Liquid Chromatographic Method ⁽⁴⁾
48	Propoxur	High-Performance Liquid Chromatographic Method ⁽⁴⁾
49	pH	Electrometric Method ⁽⁴⁾
50	Phenols	1) Distillation, Chloroform Extraction Method ⁽⁴⁾ 2) Distillation, Direct Photometric Method ⁽⁴⁾
51	Selenium	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
52	Sulfide	Iodometric Method ⁽⁴⁾
53	Temperature	Laboratory and Field Methods ⁽⁴⁾
54	Total Dissolved Solids	Dried at 180 °C ⁽⁴⁾
55	Total Kjeldahl Nitrogen	Semi-Micro Kjeldahl Method ⁽⁴⁾
56	Total Suspended Solids	Dried at 103-105 °C ⁽⁴⁾
57	Toxaphene	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
58	Trivalent Chromium	1) Digestion, Inductively Coupled Plasma Method; Colorimetric Method; Calculation ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method; Colorimetric Method; Calculation ⁽⁴⁾
59	Zinc	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ⁽⁴⁾

วิธีวิเคราะห์ จำนวน 126 รายการ

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

วิธีวิเคราะห์
(นางจิรภาณุพันธ์ อัครสกุลวิไล)
ผู้อำนวยการศูนย์มาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษ
กรมควบคุมมลพิษ

3 Aldrin...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
3	Aldrin	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
4	Anthracene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
5	Antimony	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
6	Arsenic	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
7	Atrazine	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
8	Barium	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
9	Benz(a)anthracene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
10	Benzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
11	Benzo(b)fluoranthene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
12	Benzo(k)fluoranthene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
13	Benzoic Acid	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
14	Benzo(a)pyrene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
15	Benzo(g,h,i)perylene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
16	Beryllium	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
17	Bis(2-chloroethyl)ether	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾

วิธีวิเคราะห์
(นางจิรภาณุพันธ์ อัครสกุลวิไล)
ผู้อำนวยการศูนย์มาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษ
กรมควบคุมมลพิษ

18 Bis(2-ethylhexyl)phthalate...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
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	Equilibrium Headspace, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
23	Cadmium	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
24	Carbazole	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
25	Carbon Disulfide	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
26	Carbon tetrachloride	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
27	Chlordane	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
28	p-Chloroaniline	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
29	Chlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
30	Chlorodibromomethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
31	Chloroform	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
32	2-Chlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
33	Chromium	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾

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34 Chromium (III)...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
34	Chromium (III)	1) Digestion, Inductively Coupled Plasma Method; Colorimetric Method; Calculation ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method; Colorimetric Method; Calculation ⁽⁴⁾
35	Chromium (VI)	Colorimetric Method ⁽⁴⁾
36	Chrysene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
37	Cyanide	Distillation, Colorimetric Method ⁽⁴⁾
38	2,4-D	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
39	DDD	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
40	DDE	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
41	DDT	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
42	Dibenz(a,h)anthracene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
43	Di-n-Butyl Phthalate	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
44	1,2-Dichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
45	1,3-Dichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
46	1,4-Dichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
47	3,3-Dichlorobenzidine	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
48	1,1-Dichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
49	1,2-Dichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
50	1,1-Dichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾


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51 cis-1,2-Dichloroethylene...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
51	cis-1,2-Dichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
52	trans-1,2-Dichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
53	2,4-Dichlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
54	1,2-Dichloropropane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
55	1,3-Dichloropropane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
56	1,3-Dichloropropene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
57	Dieldrin	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
58	Diethyl Phthalate	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
59	2,4-Dimethylphenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
60	2,4-Dinitrophenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
61	2,4-Dinitrotoluene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
62	2,6-Dinitrotoluene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
63	Di-n-Octyl Phthalate	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
64	Endosulfan	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
65	Endrin	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
66	Ethylbenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
67	Fluoranthene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾


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68 Fluorene...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
68	Fluorene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
69	Heptachlor	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
70	Heptachlor epoxide	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
71	Hexachlorobenzene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
72	Hexachloro-1,3-butadiene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
73	n-Hexane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
74	α-HCH	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
75	β-HCH	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
76	γ-HCH	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
77	Hexachlorocyclopentadiene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
78	Hexachloroethane	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
79	Indeno(1,2,3-cd)pyrene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
80	Isophorone	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
81	Lead	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
82	Manganese	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
83	Mercury	1) Cold Vapor Atomic Absorption Spectrometric Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾


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84 Methanol...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
84	Methanol	1) Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾ 2) Equilibrium Headspace, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
85	Methoxychlor	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
86	Methyl Bromide	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
87	Methylene Chloride	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
88	2-Methylphenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
89	2-Methylnaphthalene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
90	Methyl tert-Butyl Ether	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
91	Naphthalene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
92	Nickel	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
93	Nitrobenzene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
94	N-Nitrosodiphenylamine	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
95	N-Nitrosodi-n-Propylamine	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
96	Polychlorinated Biphenyls - PCB 1016 - PCB 1221 - PCB 1232 - PCB 1242 - PCB 1248 - PCB 1254 - PCB 1260	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾


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97 Pentachlorophenol...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
97	Pentachlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
98	pH	Electrometric Method ⁽⁴⁾
99	Phenanthrene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
100	Phenol	1) Distillation, Direct Photometric Method ⁽⁴⁾ 2) Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
101	Pyrene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
102	Selenium	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
103	Silver	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric 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	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
109	TPH (C ₈ -C ₆)	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(13,24)
110	TPH (C ₈ -C ₁₆)	Solvent Extraction, Gas Chromatographic Method ^(9,21)
111	TPH (C ₁₆ -C ₃₂)	Solvent Extraction, Gas Chromatographic Method ^(9,21)
112	1,2,4-Trichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
113	1,1,1-Trichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾

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114 1,1,2-Trichloroethane...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
114	1,1,2-Trichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
115	Trichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
116	2,4,5-Trichlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
117	2,4,6-Trichlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
118	1,3,5-Trimethylbenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
119	Vanadium	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric 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, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾

ตรวจสอบ (ปล่องระบาย) จำนวน 16 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Antimony	Isokinetic, Digestion, Inductively Coupled Plasma Method ⁽⁵⁾
2	Arsenic	Isokinetic, Digestion, Inductively Coupled Plasma Method ⁽⁵⁾

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3 Carbon Monoxide...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
3	Carbon Monoxide	1) Sampling Bag Non-Dispersive Infrared Method ⁽⁵⁾ 2) Non-Dispersive Infrared Method ⁽⁵⁾ 3) Instrumental Analyzer Method ⁽⁵⁾
4	Chlorine	1) Absorption Sampling, Ion Chromatographic Method ⁽⁵⁾ 2) Isokinetic Sampling, Ion Chromatographic Method ⁽⁵⁾
5	Copper	Isokinetic, Digestion, Inductively Coupled Plasma Method ⁽⁵⁾
6	Dioxins	Isokinetic Sampling, Analysis by ISO/IEC 17025 Accredited Laboratory or Analysis by Department of Industrial Works Registered Laboratory (Dioxins/Furans Analysis Approved) ⁽⁵⁾
7	Hydrogen Chloride	1) Absorption Sampling, Ion Chromatographic Method ⁽⁵⁾ 2) Isokinetic Sampling, Ion Chromatographic Method ⁽⁵⁾
8	Hydrogen Sulfide	Absorption Sampling, Iodometric Method ⁽⁵⁾
9	Lead	Isokinetic, Digestion, Inductively Coupled Plasma Method ⁽⁵⁾
10	Mercury	1) Isokinetic Sampling, Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ⁽⁵⁾ 2) Isokinetic, Digestion, Inductively Coupled Plasma Method ⁽⁵⁾
11	Opacity	Ringelmann's Method ⁽²⁾
12	Oxides of Nitrogen	1) Absorption Sampling, Phenoldisulfonic Acid Method ⁽⁵⁾ 2) Chemiluminescence Method ⁽⁵⁾ 3) Instrumental Analyzer Method ⁽⁵⁾
13	Sulfur Dioxide	1) Absorption Sampling, Barium-Thorin Titrimetric Method ⁽⁵⁾ 2) UV Fluorescence Method ⁽⁵⁾ 3) Instrumental Analyzer Method ⁽⁵⁾
14	Sulfuric Acid	Isokinetic Sampling, Barium-Thorin Titrimetric Method ⁽⁵⁾
15	Total Suspended Particulate	Isokinetic Sampling, Gravimetric Method ⁽⁵⁾
16	Xylene	Absorption Sampling, Gas Chromatographic Method ⁽⁵⁾

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สิ่งปฏิกูล...

สิ่งปฏิกูลหรือวัสดุที่ไม่ใช้แล้ว จำนวน 35 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Aldrin	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1,9,25) 2) Soxhlet Extraction, Gas Chromatographic Method ^(16,22) 3) Automated Soxhlet Extraction, Gas Chromatographic Method ^(22,31)
2	Antimony	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,6,15) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1,6,14) 3) Digestion, Inductively Coupled Plasma Method ^(7,15) 4) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^(7,14)
3	Arsenic	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,6,15) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1,6,14) 3) Digestion, Inductively Coupled Plasma Method ^(7,15) 4) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^(7,14)
4	Barium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,6,15) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1,6,14) 3) Digestion, Inductively Coupled Plasma Method ^(7,15) 4) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^(7,14)
5	Beryllium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,6,15) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1,6,14) 3) Digestion, Inductively Coupled Plasma Method ^(7,15) 4) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^(7,14)

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6 Cadmium...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
6	Cadmium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1.6.15) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1.6.16) 3) Digestion, Inductively Coupled Plasma Method ^(7.15) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7.16)
7	Chlordane	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1.9.25) 2) Soxhlet Extraction, Gas Chromatographic Method ^(10.22) 3) Automated Soxhlet Extraction, Gas Chromatographic Method ^(22.31)
8	Chromium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1.6.15) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1.6.16) 3) Digestion, Inductively Coupled Plasma Method ^(7.15) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7.16)
9	Chromium (III)	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method; Waste Extraction, Colorimetric Method; Calculation Method ^(1.6.15.17) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method; Waste Extraction, Colorimetric Method; Calculation Method ^(7.16.17) 3) Digestion, Inductively Coupled Plasma Method; Alkaline Digestion, Colorimetric Method; Calculation Method ^(7.16.17) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method; Alkaline Digestion, Colorimetric Method; Calculation Method ^(7.16.17)
10	Chromium (VI)	1) Waste Extraction, Colorimetric Method ^(1.6.17) 2) Alkaline Digestion, Colorimetric Method ^(8.17)

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กระทรวงพาณิชย์

11 Cobalt...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
11	Cobalt	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1.6.15) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1.6.16) 3) Digestion, Inductively Coupled Plasma Method ^(7.15) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7.16)
12	Copper	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1.6.15) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1.6.16) 3) Digestion, Inductively Coupled Plasma Method ^(7.15) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7.16)
13	2,4-D	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1.9.25) 2) Soxhlet Extraction, Gas Chromatographic Method ^(10.22) 3) Automated Soxhlet Extraction, Gas Chromatographic Method ^(22.31)
14	DDD	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1.9.25) 2) Soxhlet Extraction, Gas Chromatographic Method ^(10.22) 3) Automated Soxhlet Extraction, Gas Chromatographic Method ^(22.31)
15	DDE	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1.9.25) 2) Soxhlet Extraction, Gas Chromatographic Method ^(10.22) 3) Automated Soxhlet Extraction, Gas Chromatographic Method ^(22.31)
16	DDT	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1.9.25)

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2) Soxhlet...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
17	Dieldrin	2) Soxhlet Extraction, Gas Chromatographic Method ^(10.22) 3) Automated Soxhlet Extraction, Gas Chromatographic Method ^(22.31) 1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1.9.25)
18	Endrin	2) Soxhlet Extraction, Gas Chromatographic Method ^(10.22) 3) Automated Soxhlet Extraction, Gas Chromatographic Method ^(22.31) 1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1.9.25)
19	Heptachlor	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1.9.25) 2) Soxhlet Extraction, Gas Chromatographic Method ^(10.22) 3) Automated Soxhlet Extraction, Gas Chromatographic Method ^(22.31)
20	Lead	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1.6.15) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1.6.16) 3) Digestion, Inductively Coupled Plasma Method ^(7.15) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7.16)
21	Lindane	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1.9.25) 2) Soxhlet Extraction, Gas Chromatographic Method ^(10.22) 3) Automated Soxhlet Extraction, Gas Chromatographic Method ^(22.31)
22	Mercury	1) Waste Extraction, Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ^(1.6.18)

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กรมส่งเสริมการค้าระหว่างประเทศ
กระทรวงพาณิชย์

2) Waste Extraction...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
23	Methoxychlor	2) Waste Extraction, Thermal Decomposition Amalgamation and Atomic Absorption Spectrometric Method ^(1.6.19) 3) Waste Extraction, Digestion, Cold-Vapor Atomic Fluorescence Spectrometric Method ^(1.6.20) 4) Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ⁽¹⁸⁾ 5) Thermal Decomposition Amalgamation and Atomic Absorption Spectrometric Method ⁽¹⁹⁾ 6) Digestion, Cold-Vapor Atomic Fluorescence Spectrometric Method ⁽²⁰⁾
24	Mirex	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1.9.25) 2) Soxhlet Extraction, Gas Chromatographic Method ^(10.22) 3) Automated Soxhlet Extraction, Gas Chromatographic Method ^(22.31)
25	Molybdenum	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1.6.15) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1.6.16) 3) Digestion, Inductively Coupled Plasma Method ^(7.15) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7.16)
26	Nickel	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1.6.15) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1.6.16) 3) Digestion, Inductively Coupled Plasma Method ^(7.15) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7.16)

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27 Polychlorinated...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
27	Polychlorinated biphenyls (PCBs) - Aroclor 1016 - Aroclor 1221 - Aroclor 1232 - Aroclor 1242 - Aroclor 1248 - Aroclor 1254 - Aroclor 1260 - 2-Chlorobiphenyl - 2,3-Dichlorobiphenyl - 2,2',5'-Trichlorobiphenyl - 2,4',5'-Trichlorobiphenyl - 2,2',3,5'-Tetrachlorobiphenyl - 2,2',5,5'-Tetrachlorobiphenyl - 2,3',4,4'-Tetrachlorobiphenyl - 2,2',3,4,5'-Pentachlorobiphenyl - 2,2',4,5,5'-Pentachlorobiphenyl - 2,3,3',4',6-Pentachlorobiphenyl - 2,2',3,4,4',5'-Hexachlorobiphenyl - 2,2',3,4,5,5'-Hexachlorobiphenyl - 2,2',3,5,5',6-Hexachlorobiphenyl - 2,2',4,4',5,5'-Hexachlorobiphenyl - 2,2',3,3',4,4',5'-Heptachlorobiphenyl - 2,2',3,4,4',5,5'-Heptachlorobiphenyl - 2,2',3,4,4',5',6-Heptachlorobiphenyl - 2,2',3,4',5,5',6-Heptachlorobiphenyl - 2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^(1,9,23) 2) Soxhlet Extraction, Gas Chromatographic Method ^(10,23) 3) Automated Soxhlet Extraction, Gas Chromatographic Method ^(22,31)

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28 Pentachlorophenol...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
28	Pentachlorophenol	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1,9,23) 2) Soxhlet Extraction, Gas Chromatographic Method ^(10,23) 3) Automated Soxhlet Extraction, Gas Chromatographic Method ^(22,31)
29	pH	Electrometric Method ^(29,30)
30	Selenium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,6,15) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1,6,16) 3) Digestion, Inductively Coupled Plasma Method ^(7,15) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,16)
31	Silver	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,6,15) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1,6,16)
32	Thallium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,6,15) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1,6,16) 3) Digestion, Inductively Coupled Plasma Method ^(7,15) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,16)
33	Toxaphene	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1,9,23) 2) Soxhlet Extraction, Gas Chromatographic Method ^(10,23) 3) Automated Soxhlet Extraction, Gas Chromatographic Method ^(22,31)
34	Vanadium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,6,15) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1,6,16) 3) Digestion, Inductively Coupled Plasma Method ^(7,15)

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4) Digestion...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
35	Zinc	4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,16) 1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,6,15) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1,6,16) 3) Digestion, Inductively Coupled Plasma Method ^(7,15) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,16)

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ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Acenaphthene	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31)
2	Acetone	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(14,24)
3	Aldrin	1) Soxhlet Extraction, Gas Chromatographic Method ^(10,22) 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31)
4	Anthracene	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31)
5	Antimony	1) Digestion, Inductively Coupled Plasma Method ^(7,15) 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,16)
6	Arsenic	1) Digestion, Inductively Coupled Plasma Method ^(7,15) 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,16)
7	Atrazine	1) Soxhlet Extraction, Gas Chromatographic Method ^(10,22) 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31)
8	Barium	1) Digestion, Inductively Coupled Plasma Method ^(7,15) 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,16)

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9 Benz(a)anthracene...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
9	Benz(a)anthracene	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31)
10	Benzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(14,24)
11	Benzo(b)fluoranthene	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31)
12	Benzo(k)fluoranthene	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31)
13	Benzoic acid	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31)
14	Benzo(a)pyrene	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31)
15	Benzo(g,h,i)perylene	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31)
16	Beryllium	1) Digestion, Inductively Coupled Plasma Method ^(7,15) 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,16)
17	Bis(2-chloroethyl)ether	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31)
18	Bis(2-ethylhexyl)phthalate	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31)
19	Bromodichloromethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(14,24)
20	Bromoform	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(14,24)
21	Butanol	Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method ^(12,24)
22	Butyl Benzyl Phthalate	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31)
23	Cadmium	1) Digestion, Inductively Coupled Plasma Method ^(7,15) 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,16)
24	Carbazole	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31)
25	Carbon Disulfide	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(14,24)

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26 Carbon tetrachloride...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
26	Carbon tetrachloride	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(14,24)
27	Chlordane	1) Soxhlet Extraction, Gas Chromatographic Method ^(10,22) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
28	p-Chloroaniline	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
29	Chlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(14,24)
30	Chlorodibromomethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(14,24)
31	Chloroform	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(14,24)
32	2-Chlorophenol	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
33	Chromium	1) Digestion, Inductively Coupled Plasma Method ^(7,15) 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^(7,16)
34	Chromium (III)	1) Digestion, Inductively Coupled Plasma Method; Alkaline Digestion, Colorimetric Method; Calculation Method ^(7,8,15,17) 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method; Alkaline Digestion, Colorimetric Method; Calculation Method ^(7,8,16,17)
35	Chromium (VI)	Alkaline Digestion, Colorimetric Method ^(8,17)
36	Chrysene	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
37	Cyanide	Extraction, Distillation, Colorimetric Method ^(26,27,28)
38	2,4-D	1) Soxhlet Extraction, Gas Chromatographic Method ^(10,22) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
39	DDD	1) Soxhlet Extraction, Gas Chromatographic Method ^(10,22) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)

40 DDE...

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ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
40	DDE	1) Soxhlet Extraction, Gas Chromatographic Method ^(10,22) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
41	DDT	1) Soxhlet Extraction, Gas Chromatographic Method ^(10,22) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
42	Dibenz(a,h)anthracene	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
43	Di-n-Butyl Phthalate	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
44	1,2-Dichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(14,24)
45	1,3-Dichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(14,24)
46	1,4-Dichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(14,24)
47	3,3-Dichlorobenzidine	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
48	1,1-Dichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(14,24)
49	1,2-Dichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(14,24)
50	1,1-Dichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(14,24)
51	cis-1,2-Dichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(14,24)
52	trans-1,2-Dichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(14,24)
53	2,4-Dichlorophenol	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
54	1,2-Dichloropropane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(14,24)
55	1,3-Dichloropropane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(14,24)
56	1,3-Dichloropropene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(14,24)

57 Dieldrin...

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ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
57	Dieldrin	1) Soxhlet Extraction, Gas Chromatographic Method ^(10,22) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
58	Diethyl Phthalate	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
59	2,4-Dimethylphenol	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
60	2,4-Dinitrophenol	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
61	2,4-Dinitrotoluene	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
62	2,6-Dinitrotoluene	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
63	Di-n-Octyl Phthalate	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
64	Endosulfan	1) Soxhlet Extraction, Gas Chromatographic Method ^(10,22) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
65	Endrin	1) Soxhlet Extraction, Gas Chromatographic Method ^(10,22) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
66	Ethylbenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(14,24)
67	Fluoranthene	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
68	Fluorene	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
69	Heptachlor	1) Soxhlet Extraction, Gas Chromatographic Method ^(10,22) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
70	Heptachlor Epoxide	1) Soxhlet Extraction, Gas Chromatographic Method ^(10,22) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)

71 Hexachlorobenzene...

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ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
71	Hexachlorobenzene	1) Soxhlet Extraction, Gas Chromatographic Method ^(10,22) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
72	Hexachloro-1,3-butadiene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(14,24)
73	n-Hexane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(14,24)
74	α-HCH	1) Soxhlet Extraction, Gas Chromatographic Method ^(10,22) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
75	β-HCH	1) Soxhlet Extraction, Gas Chromatographic Method ^(10,22) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
76	γ-HCH	1) Soxhlet Extraction, Gas Chromatographic Method ^(10,22) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
77	Hexachlorocyclopentadiene	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
78	Hexachloroethane	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
79	Indeno(1,2,3-cd)pyrene	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
80	Isophorone	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
81	Lead	1) Digestion, Inductively Coupled Plasma Method ^(7,15) 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^(7,16)
82	Manganese	1) Digestion, Inductively Coupled Plasma Method ^(7,15) 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^(7,16)
83	Mercury	1) Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ⁽¹⁸⁾

2) Thermal...

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ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
84	Methanol	2) Thermal Decomposition, Amalgamation, and Atomic Absorption Spectrophotometry ⁽¹⁾⁽¹⁾ 3) Digestion, Cold-Vapor Atomic Fluorescence Spectrometric Method ⁽²⁰⁾ Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method ^(12,24)
85	Methoxychlor	1) Soxhlet Extraction, Gas Chromatographic Method ^(10,22) 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31)
86	Methyl Bromide	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(14,24)
87	Methylene Chloride	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(14,24)
88	2-methylphenol	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31)
89	2-Methylnaphthalene	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31)
90	Methyl tert-Butyl Ether	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(14,24)
91	Naphthalene	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31)
92	Nickel	1) Digestion, Inductively Coupled Plasma Method ^(7,15) 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,14)
93	Nitrobenzene	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31)
94	N-Nitrosodiphenylamine	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31)
95	N-Nitrosodi-n-propylamine	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31)
96	Polychlorinated biphenyls (PCBs) - Aroclor 1016 - Aroclor 1221 - Aroclor 1232	1) Soxhlet Extraction, Gas Chromatographic Method ^(10,22) 2) Automated Soxhlet Extraction, Gas Chromatographic Method ^(25,31)

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- Aroclor 1242...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
	- Aroclor 1242 - Aroclor 1248 - Aroclor 1254 - Aroclor 1260 - 2-Chlorobiphenyl - 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',4,4',6-Pentachlorobiphenyl - 2,2',3,4,4',5'-Hexachlorobiphenyl - 2,2',3,4,5,5'-Hexachlorobiphenyl - 2,2',3,5,5',6-Hexachlorobiphenyl - 2,2',4,4',5,5'-Hexachlorobiphenyl - 2,2',3,3',4,4',5'-Heptachlorobiphenyl - 2,2',3,4,4',5,5'-Heptachlorobiphenyl - 2,2',3,4,4',5,6'-Heptachlorobiphenyl - 2,2',3,4',5,5',6'-Heptachlorobiphenyl - 2,2',3,3',4,4',5,6'-Nonachlorobiphenyl - Pentachlorophenol	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31)
97	Phenanthrene	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31)
98	Phenol	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31)
99	Pyrene	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31)
100		

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101 Selenium...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
101	Selenium	1) Digestion, Inductively Coupled Plasma Method ^(7,15) 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,14)
102	Silver	1) Digestion, Inductively Coupled Plasma Method ^(7,15) 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,14)
103	Styrene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(14,24)
104	1,1,2,2-Tetrachloroethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(14,24)
105	Tetrachloroethylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(14,24)
106	Toluene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(14,24)
107	Toxaphene	1) Soxhlet Extraction, Gas Chromatographic Method ^(10,22) 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31)
108	TPH (C ₅ -C ₆)	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(14,24)
109	TPH (C ₈ -C ₁₆)	1) Solvent Extraction, Gas Chromatographic Method ^(11,21) 2) Automated Soxhlet Extraction, Gas Chromatographic Method ^(21,31)
110	TPH (C ₁₈ -C ₃₅)	1) Solvent Extraction, Gas Chromatographic Method ^(11,21) 2) Automated Soxhlet Extraction, Gas Chromatographic Method ^(21,31)
111	1,2,4-Trichlorobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(14,24)
112	1,1,1-Trichloroethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(14,24)
113	1,1,2-Trichloroethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(14,24)
114	Trichloroethylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(14,24)
115	2,4,5-Trichlorophenol	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31)

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116 2,4,6-Trichlorophenol...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
116	2,4,6-Trichlorophenol	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31)
117	1,3,5-Trimethylbenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(14,24)
118	Vanadium	1) Digestion, Inductively Coupled Plasma Method ^(7,15) 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,14)
119	Vinyl Acetate	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(14,24)
120	Vinyl Chloride	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(14,24)
121	m-Xylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(14,24)
122	o-Xylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(14,24)
123	p-Xylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(14,24)
124	Xylene (Total)	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(14,24)
125	Zinc	1) Digestion, Inductively Coupled Plasma Method ^(7,15) 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,14)

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กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบผลิตภัณฑ์และทะเบียนห้องปฏิบัติการ กอวิชัยและเคอีนกับมลพิษโรงงาน กรมโรงงานอุตสาหกรรม โทร. ๐ ๒๒๒๒ ๔๐๐๖, ๔๔๖๖



ที่ อก ๐๓๑๐(๑)/ ๕๕ ๓ ๗/ ๕

กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท
เขตราชเทวี กรุงเทพฯ ๑๐๕๐๐

๐ ๕ มีนาคม ๒๕๖๖

เรื่อง เปลี่ยนแปลงบุคลากรของห้องปฏิบัติการวิเคราะห์

เรียน กรรมการผู้จัดการ บริษัท เอลแอล แอสซอร์ซิเอตส์ กรุ๊ป (ประเทศไทย) จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และขออนุญาตใช้ห้องปฏิบัติการวิเคราะห์ของเอกชน
ลงวันที่ ๔ กุมภาพันธ์ ๒๕๖๖

ตามหนังสือที่อ้างถึง บริษัท เอลแอล แอสซอร์ซิเอตส์ กรุ๊ป (ประเทศไทย) จำกัด ห้องปฏิบัติการ
วิเคราะห์เอกชน เลขทะเบียน ๖-๒๐๔ สถานที่ตั้งเลขที่ ๑๐๔ ซอยพัฒนาการ ๔๖ ถนนพัฒนาการ แขวงพัฒนาการ
เขตสวนหลวง กรุงเทพมหานคร ขอเปลี่ยนแปลงบุคลากรของห้องปฏิบัติการวิเคราะห์ ความละเอียดแจ้งแล้ว นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว มีความเห็นดังนี้

๑. ให้ยกเลิกเจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๑๔ ราย

- | | |
|---------------------------------|----------------------------|
| ๑) นายนคร สุขเจริญ | ทะเบียนเลขที่ ๖-๒๐๔-จ-๖๒๒๒ |
| ๒) นายปัญญา นามเขตต์ | ทะเบียนเลขที่ ๖-๒๐๔-จ-๖๒๒๓ |
| ๓) นายอรุณพล นิยมวิทยาพันธ์ | ทะเบียนเลขที่ ๖-๒๐๔-จ-๖๒๒๔ |
| ๔) นางสาวพัชรียา หงษ์สมิต | ทะเบียนเลขที่ ๖-๒๐๔-จ-๖๒๒๕ |
| ๕) นางสาวกานิดา สุวงศ์ศรีตระกูล | ทะเบียนเลขที่ ๖-๒๐๔-จ-๖๒๒๖ |
| ๖) นางสาวศรวิทย์ ยิ่งดี | ทะเบียนเลขที่ ๖-๒๐๔-จ-๖๒๒๗ |
| ๗) นายสมโภช วันสา | ทะเบียนเลขที่ ๖-๒๐๔-จ-๖๒๒๘ |
| ๘) นายณัฐนันท์ ปานประเสริฐ | ทะเบียนเลขที่ ๖-๒๐๔-จ-๖๒๒๙ |
| ๙) วาที่รียะวิภาณพจน์ แสนศรี | ทะเบียนเลขที่ ๖-๒๐๔-จ-๖๒๓๐ |
| ๑๐) นายมนันท์ พุกศิริ | ทะเบียนเลขที่ ๖-๒๐๔-จ-๖๒๓๑ |
| ๑๑) นายณัฐดนัย เจือระยอง | ทะเบียนเลขที่ ๖-๒๐๔-จ-๖๒๓๒ |
| ๑๒) นางสาวกาญจนา คงคุณ | ทะเบียนเลขที่ ๖-๒๐๔-จ-๖๒๓๓ |
| ๑๓) นางสาววิชกร เนียมกลาง | ทะเบียนเลขที่ ๖-๒๐๔-จ-๖๒๓๔ |
| ๑๔) นางสาวกาญจนากร ศรีนิลหา | ทะเบียนเลขที่ ๖-๒๐๔-จ-๖๒๓๕ |
| ๑๕) นายศิริวัฒน์ พานิชย์ | ทะเบียนเลขที่ ๖-๒๐๔-จ-๖๒๓๖ |
| ๑๖) นางสาวนภกรณี อูระ | ทะเบียนเลขที่ ๖-๒๐๔-จ-๖๒๓๗ |
| ๑๗) นางสาวจิตสุภา ประเทืองสุข | ทะเบียนเลขที่ ๖-๒๐๔-จ-๖๒๓๘ |
| ๑๘) นางสาวอริสา วิริยะนิตยธรรม | ทะเบียนเลขที่ ๖-๒๐๔-จ-๖๒๓๙ |
| ๑๙) นางสาวพนิดา ยอดอินทร์ | ทะเบียนเลขที่ ๖-๒๐๔-จ-๖๒๔๐ |

๒. ให้เพิ่มเจ้าหน้าที่

๒. ให้เพิ่มเจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๕ ราย

- | | |
|---------------------------------|----------------------------|
| ๑) นายก้องเกียรติ กิตติคุณนิชัย | ทะเบียนเลขที่ ๖-๒๐๔-จ-๐๐๐๑ |
| ๒) นายพิรพล สว่างใจธรรม | ทะเบียนเลขที่ ๖-๒๐๔-จ-๐๐๐๒ |
| ๓) นายณัฐวิทย์ เทือกคำดี | ทะเบียนเลขที่ ๖-๒๐๔-จ-๐๐๐๓ |
| ๔) นายศิริโชค พงษ์ประสม | ทะเบียนเลขที่ ๖-๒๐๔-จ-๐๐๐๔ |
| ๕) นายณัฐวุฒิ ศักดิ์แพง | ทะเบียนเลขที่ ๖-๒๐๔-จ-๐๐๐๕ |

อนึ่ง หนังสือฉบับนี้จะหมดอายุหรือหนังสือสูญหายไปขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน
ที่ อก ๐๓๑๐(๑)/๑๐๖๖ ลงวันที่ ๒๘ มกราคม ๒๕๖๔ คือในวันที่ ๒ กันยายน ๒๕๖๖ ทั้งนี้ สามารถยื่นคำขอ
ย่นอายุใบขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์ได้ทั้งนี้ขึ้นกับผลการตรวจตาม QR Code ยืนยันหนังสือฉบับนี้

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ


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กอวิชัยและเคอีนกับมลพิษโรงงาน
กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบผลิตภัณฑ์และทะเบียนห้องปฏิบัติการ
โทร. ๐ ๒๒๒๒ ๔๐๐๖ ต่อ ๒๒๒๒-๔
โทรสาร ๐ ๒๒๒๒ ๔๐๐๖ ต่อ ๒๒๒๒-๕
ไปรษณีย์อิเล็กทรอนิกส์ sarabang@dw.its.go.th



เอกสารแนบท้ายหนังสือรับต่ออายุขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน
บริษัท แอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด เลขทะเบียน ว-๒๖๗
ที่ ออก ๐๓๒๒/๕๙๖๕๔

ลงวันที่ ๒๕ มิ.ย. ๒๕๖๖

ขอขยายสารมลพิษที่ได้รับการขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๓๗ รายการ
ไว้เสีย จำนวน 25 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Arsenic	Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[1]
2	Barium	Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[1]
3	Biochemical Oxygen Demand	5-Day BOD Test, Azide Modification Method ^[1] 5-Day BOD Test, Membrane Electrode Method ^[1]
4	Cadmium	Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[1]
5	Chemical Oxygen Demand	Closed Reflux, Colorimetric Method ^[1] Closed Reflux, Titrimetric Method ^[1]
6	Chromium	Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[1]
7	Color	ADMI Weighted-Ordinate Spectrophotometric Method ^[1]
8	Copper	Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[1]
9	Formaldehyde	Distillation, Colorimetric Method ^[2]
10	Free Chlorine	DPD Ferrous Titrimetric Method ^[1]
11	Hexavalent Chromium	Filtration, Colorimetric Method ^[1]
12	Lead	Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[1]
13	Manganese	Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[1]
14	Mercury	Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[1]
15	Nickel	Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[1]
16	Oil & Grease	Liquid-Liquid, Partition-Gravimetric Method ^[1]

บุษภา รัตนสุภา
(นางสาวบุษยา รัตนสุภา)
นักวิทยาศาสตร์ชำนาญการ

17 pH...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
17	pH	Electrometric Method ^[1]
18	Phenol	Distillation, Direct Photometric Method ^[1]
19	Selenium	Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[1]
20	Sulfide	ZnS Precipitation, Iodometric Method ^[1]
21	Temperature	Laboratory and Field Methods ^[1]
22	Total Dissolved Solids	Dried at 180 °C ^[1]
23	Total Suspended Solids	Dried at 103-105 °C ^[1]
24	Trivalent Chromium	Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[1]
25	Zinc	Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[1]

อภาวดีเสีย จำนวน 12 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Antimony	Isokinetic Sampling, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[1]
2	Arsenic	Isokinetic Sampling, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[1]
3	Carbon Monoxide	Sampling Bag Non-Dispersive Infrared Method ^[1]
4	Copper	Isokinetic Sampling, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[1]
5	Dioxins	Isokinetic Sampling, Analysis by ISO/IEC 17025 Accredited Laboratory or Analysis by Department of Industrial Works Registered Laboratory ^[1]
6	Hydrogen Sulfide	Absorption, Iodometric Method ^[1]
7	Lead	Isokinetic Sampling, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[1]
8	Opacity	Ringelmann's Method ^[1]
9	Oxides of Nitrogen	Absorption Sampling, Phenoldisulfonic acid Method ^[1]
10	Sulfur Dioxide	Absorption Sampling, Barium-Thorin Titrimetric Method ^[1]
11	Sulfuric acid	Isokinetic Sampling, Barium-Thorin Titrimetric Method ^[1]
12	Total Suspended Particulate	Isokinetic Sampling, Gravimetric Method ^[1]

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เอกสารอ้างอิง....

เอกสารอ้างอิง

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