

ภาคผนวก ค-8

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คุณภาพน้ำทิ้งแบบต่อเนื่อง

**ค่าคุณภาพน้ำที่ตรวจวัดต่อเนื่อง เดือนกรกฎาคม ถึงเดือนธันวาคม 2565**

Month	Name	pH	CONDUCTIVITY	TEMPERATURE
	Unit	-	uS/cm	degC
	Standard	6.5-8.5	<2,000	<34
Jul-22	Max	8.27	1,374.90	32.90
	Min	7.11	1,200.60	29.60
Aug-22	Max	8.30	1,371.50	32.30
	Min	6.79	889.60	25.90
Sep-22	Max	7.41	1,029.10	32.90
	Min	6.61	828.20	27.90
Oct-22	Max	8.11	1,241.10	31.20
	Min	6.71	705.50	26.10
Nov-22	Max	8.20	1,335.40	32.70
	Min	6.93	1,196.50	27.70
Dec-22	Max	7.98	1,371.00	27.90
	Min	6.90	1,118.90	23.20











































ภาคผนวก ค-9

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เพลงก็ตอนพีช เพลงก็ตอนสัตว์ และสัตว์หน้าดิน



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

Client : Gulf JP NS Co., Ltd.  
Address : 36 Moo 4 Nong Kob, Nong Saeng, Saraburi, Thailand, 18170  
Project Name : Monitoring EIA  
Project Location : GNS

รายงานผลการวิเคราะห์แหล่งก้นพื้น  
ตาราง ผลการวิเคราะห์แหล่งก้นพื้น (เก็บตัวอย่างวันที่ 28 พฤศจิกายน 2565)

ชนิดแหล่งก้นพื้น	ปริมาณแหล่งก้นพื้น (หน่วยต่อลิตร)					
	22117363-1	22117363-2	22117363-3	22117363-4	22117363-5	22117363-6
Division Cyanophyta						
Class Cyanophyceae						
Order Chroococcales						
Family Chroococcaceae						
1. <i>Microcystis aeruginosa</i>	46,000	42,000	-	-	-	-
Order Nostocales						
Family Oscillatoriaceae						
2. <i>Lyngbya contorta</i>	-	-	26,000	-	-	-
3. <i>Oscillatoria brevis</i>	-	-	13,000	-	-	-
4. <i>Oscillatoria princeps</i>	-	-	-	-	-	16,000
5. <i>Oscillatoria</i> sp.	174,000	111,000	92,000	-	106,000	16,000
6. <i>Spirulina platensis</i>	-	-	92,000	-	-	-
Family Nostocaceae						
7. <i>Cylindrocapsa majus</i>	278,000	389,000	-	-	-	-

ตาราง ผลการวิเคราะห์แหล่งก้นพื้น (เก็บตัวอย่างวันที่ 28 พฤศจิกายน 2565)  
(ต่อ)

ชนิดแหล่งก้นพื้น	ปริมาณแหล่งก้นพื้น (หน่วยต่อลิตร)					
	22117363-1	22117363-2	22117363-3	22117363-4	22117363-5	22117363-6
8. <i>Raphidiopsis</i> sp.	81,000	-	53,000	-	-	-
Family Rivulariaceae						
9. <i>Calothrix</i> sp.	-	-	40,000	170,000	-	-
Division Chlorophyta						
Class Chlorophyceae						
Order Volvocales						
Family Volvocaceae						
10. <i>Eudorina elegans</i>	58,000	28,000	-	-	-	-
Order Chlorococcales						
Family Hydrodictyaceae						
11. <i>Pediastrum duplex</i>	104,000	70,000	13,000	-	-	-
12. <i>Pediastrum simplex</i>	418,000	403,000	53,000	-	15,000	47,000
13. <i>Pediastrum tetras</i>	58,000	14,000	-	-	-	31,000
Family Coelastraceae						
14. <i>Coelastrum microporum</i>	46,000	-	-	-	91,000	-
15. <i>Coelastrum sphaericum</i>	12,000	28,000	-	14,000	-	-
Family Oocystaceae						
16. <i>Ankistrodesmus falcatus</i>	23,000	57,000	-	-	-	-
17. <i>Dictyosphaerium pulchellum</i>	104,000	42,000	13,000	-	-	-
18. <i>Kirchneriella subsolitaria</i>	35,000	-	-	-	-	-
19. <i>Tetradron trigonum</i>	-	-	-	-	-	16,000
Family Scenedesmeceae						
20. <i>Scenedesmus armatus</i>	186,000	70,000	-	-	45,000	-
21. <i>Scenedesmus dinorpha</i>	-	42,000	-	-	-	-
22. <i>Scenedesmus opoliensis</i>	63,000	139,000	-	71,000	30,000	-

ตาราง ผลการวิเคราะห์แหล่งกักตอมพืช (เก็บตัวอย่างวันที่ 28 พฤศจิกายน 2565)

ชนิดแหล่งกักตอมพืช	ปริมาณแหล่งกักตอมพืช (หน่วยกิโลกรัม)				
	22117363-1	22117363-2	22117363-3	22117363-4	22117363-5
<b>Order Zygomatales</b>					
<b>Family Mesotaeniaceae</b>					
23. <i>Goutozygon</i> sp.	603,000	612,000	16,000	-	-
<b>Family Desmidiaceae</b>					
24. <i>Closterium gracile</i>	-	97,000	-	-	-
25. <i>Closterium</i> sp.	58,000	-	13,000	-	-
26. <i>Cosmarium</i> sp.	-	-	-	-	15,000
27. <i>Enastrum sinuosum</i>	-	14,000	-	-	-
28. <i>Staurostrum gracile</i>	23,000	14,000	-	-	-
<b>Class Euglenophyceae</b>					
<b>Order Euglenales</b>					
<b>Family Euglenaceae</b>					
29. <i>Euglena acus</i>	232,000	167,000	158,000	71,000	76,000
30. <i>Euglena oxyuris</i>	-	14,000	-	-	-
31. <i>Euglena viridis</i>	232,000	278,000	-	14,000	45,000
32. <i>Lepocinclis ovum</i>	209,000	361,000	53,000	14,000	60,000
33. <i>Phacus angelanus</i>	58,000	125,000	13,000	-	-
34. <i>Phacus hamatus</i>	104,000	-	-	-	-
35. <i>Phacus horridus</i>	-	14,000	-	-	-
36. <i>Phacus longicauda</i>	-	57,000	13,000	-	-
37. <i>Phacus myersi</i>	-	57,000	-	-	-
38. <i>Phacus platylea</i>	35,000	-	-	-	-
39. <i>Phacus pleuronectes</i>	-	28,000	-	-	-
40. <i>Phacus ramula</i>	23,000	42,000	-	-	-
41. <i>Phacus</i> sp.	58,000	-	-	-	-
42. <i>Phacus tortus</i>	12,000	153,000	66,000	14,000	-
43. <i>Strombomonas australica</i>	104,000	14,000	-	-	-

ตาราง ผลการวิเคราะห์แหล่งกักตอมพืช (เก็บตัวอย่างวันที่ 28 พฤศจิกายน 2565)

ชนิดแหล่งกักตอมพืช	ปริมาณแหล่งกักตอมพืช (หน่วยกิโลกรัม)					
	22117363-1	22117363-2	22117363-3	22117363-4	22117363-5	22117363-6
44. <i>Strombomonas fluvialis</i>	325,000	209,000	568,000	113,000	-	-
45. <i>Strombomonas gibberosa</i>	371,000	334,000	66,000	-	-	-
46. <i>Strombomonas girardiana</i>	464,000	445,000	66,000	-	121,000	16,000
47. <i>Strombomonas</i> sp.	46,000	-	-	-	-	-
48. <i>Trachelomonas crebea</i>	348,000	556,000	119,000	-	-	62,000
49. <i>Trachelomonas dangerdiana</i>	-	-	-	-	-	-
50. <i>Trachelomonas hispida</i>	174,000	348,000	119,000	127,000	151,000	140,000
51. <i>Trachelomonas mirabilis</i>	-	28,000	26,000	-	-	-
52. <i>Trachelomonas</i> sp.	-	57,000	-	-	-	-
53. <i>Trachelomonas volzii</i>	12,000	14,000	26,000	-	-	-
<b>Division Chromophyta</b>						
<b>Class Bacillariophyceae</b>						
<b>Order Biddulphiales</b>						
<b>Suborder Coscinodiscineae</b>						
<b>Family Thalassiosiraceae</b>						
54. <i>Cyclotella menghiniana</i>	220,000	361,000	145,000	226,000	-	109,000
55. <i>Cyclotella stelligera</i>	139,000	42,000	-	99,000	60,000	31,000
<b>Family Aulacoseiraceae</b>						
56. <i>Aulacoseira baicalensis</i>	696,000	306,000	211,000	-	60,000	16,000
57. <i>Aulacoseira granulata</i>	557,000	222,000	277,000	113,000	-	109,000
<b>Order Bacillariales</b>						
<b>Suborder Fragilariaceae</b>						
<b>Family Fragilariaceae</b>						
58. <i>Fragilaria capricina</i>	151,000	-	-	-	-	31,000
59. <i>Synedra acus</i>	-	-	79,000	-	-	31,000
60. <i>Synedra rumpens</i>	58,000	57,000	13,000	-	30,000	-
61. <i>Synedra ulna</i>	93,000	784,000	66,000	212,000	-	1,804,000

ตาราง ผลการวิเคราะห์ผลองค์ประกอบพืช (เก็บตัวอย่างวันที่ 28 พฤศจิกายน 2565)

(ต่อ)

ชนิดพืชองค์ประกอบพืช	ปริมาณแห้งองค์ประกอบพืช (หน่วยต่อลิตร)					
	22117363-1	22117363-2	22117363-3	22117363-4	22117363-5	22117363-6
<b>Family Licnophoriaceae</b>						
62. <i>Licnophora abbreviata</i>	-	-	-	-	15,000	-
<b>Suborder Bacillariineae</b>						
<b>Family Eunotiaceae</b>						
63. <i>Eunotia lineolata</i>	-	139,000	-	-	-	-
64. <i>Eunotia pectinalis</i>	70,000	70,000	132,000	283,000	76,000	156,000
<b>Family Achnanthaceae</b>						
65. <i>Coconeis</i> sp.	-	14,000	-	-	-	-
<b>Family Cymbellaceae</b>						
66. <i>Gomphonema parvulum</i>	46,000	417,000	26,000	297,000	15,000	140,000
<b>Family Naviculaceae</b>						
67. <i>Amphora</i> sp.	-	-	-	14,000	-	-
68. <i>Gyrosigma attenuatum</i>	46,000	14,000	13,000	28,000	-	-
69. <i>Gyrosigma scalproigres</i>	-	28,000	-	-	-	-
70. <i>Gyrosigma</i> sp.	-	57,000	40,000	-	-	-
71. <i>Navicula lanceolata</i>	35,000	-	-	28,000	-	-
72. <i>Navicula</i> sp.	-	28,000	26,000	-	30,000	-
73. <i>Pinnularia gibba</i>	12,000	57,000	-	28,000	-	-
<b>Family Bacillariaceae</b>						
74. <i>Nitzschia acicularis</i>	267,000	97,000	13,000	-	-	47,000
75. <i>Nitzschia lorenziana</i>	46,000	-	13,000	-	-	-
76. <i>Nitzschia reversa</i>	70,000	-	-	-	-	-
77. <i>Nitzschia sigmoidea</i>	-	-	-	14,000	-	16,000
78. <i>Nitzschia</i> sp.	128,000	28,000	-	-	15,000	-
79. <i>Tryblionella victoriae</i>	81,000	-	-	-	-	-
<b>Family Surirellaceae</b>						
80. <i>Surirella elegans</i>	58,000	125,000	13,000	85,000	-	-

ตาราง ผลการวิเคราะห์ผลองค์ประกอบพืช (เก็บตัวอย่างวันที่ 28 พฤศจิกายน 2565)

(ต่อ)

ชนิดพืชองค์ประกอบพืช	ปริมาณแห้งองค์ประกอบพืช (หน่วยต่อลิตร)					
	22117363-1	22117363-2	22117363-3	22117363-4	22117363-5	22117363-6
81. <i>Surirella linearis</i>	35,000	181,000	26,000	28,000	-	16,000
82. <i>Surirella robusta</i>	-	14,000	-	14,000	15,000	16,000
83. <i>Surirella tenera</i>	-	42,000	-	71,000	-	31,000
<b>Class Dinophyceae</b>						
<b>Order Gonyaulacalea</b>						
<b>Family Ceratiaceae</b>						
84. <i>Ceratium hirundinella</i>	-	28,000	-	-	-	-
<b>Order Peridinales</b>						
<b>Family Peridiniaceae</b>						
85. <i>Peridinium cunningtonii</i>	-	28,000	-	-	-	-
86. <i>Peridinium gattumense</i>	23,000	-	-	-	-	-
87. <i>Peridinium</i> sp.	-	42,000	-	-	-	-
<b>ชนิดพืชองค์ประกอบพืช</b>	<b>55</b>	<b>61</b>	<b>38</b>	<b>24</b>	<b>20</b>	<b>27</b>
<b>ปริมาณแห้งองค์ประกอบพืช</b>	<b>8,008,000</b>	<b>8,654,000</b>	<b>2,810,000</b>	<b>2,148,000</b>	<b>1,071,000</b>	<b>3,162,000</b>
<b>ดัชนีความหลากหลายผลองค์ประกอบพืช</b>	<b>3.5348</b>	<b>3.5351</b>	<b>3.0577</b>	<b>2.7475</b>	<b>2.7463</b>	<b>1.9399</b>
<b>ดัชนีความสม่ำเสมอผลองค์ประกอบพืช</b>	<b>0.8821</b>	<b>0.8599</b>	<b>0.8406</b>	<b>0.8645</b>	<b>0.9167</b>	<b>0.5886</b>

Sample Location : 1. สถานี 22117363-1 : แม่น้ำปากสัก : สถานีสูบน้ำ ของโครงการโรงไฟฟ้าหนองแสง 200 เมตร

2. สถานี 22117363-2 : แม่น้ำปากสัก : สถานีสูบน้ำ ของโครงการโรงไฟฟ้าหนองแสง

3. สถานี 22117363-3 : แม่น้ำปากสัก : สถานีสูบน้ำ ของโครงการโรงไฟฟ้าหนองแสง 200 เมตร

4. สถานี 22117363-4 : คลองหัวข่า (คลองหนองเกลือ) : เหมืองลูกระเบบข้างข้างของ

โครงการโรงไฟฟ้าหนองแสง ขึ้นไป 500 เมตร

5. สถานี 22117363-5 : คลองหัวข่า (คลองหนองเกลือ) : เหมืองลูกระเบบข้างข้างของโรงไฟฟ้าหนองแสง

6. สถานี 22117363-6 : คลองหัวข่า (คลองหนองเกลือ) : เหมืองลูกระเบบข้างข้างของ

โครงการโรงไฟฟ้าหนองแสง ลง ไป 500 เมตร

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

นางสาวกนกวรรณ ขวุดอน  
ผู้วิเคราะห์

นางสาวกนก อิมทรชาติ  
หัวหน้าสถานีวิจัยประมงศรีราชา



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

Client : Gulf JP NS Co., Ltd.  
Address : 36 Moo 4 Nong Kob, Nong Saeng, Saraburi, Thailand, 18170  
Project Name : Monitoring EIA  
Project Location : GNS

รายงานผลการวิเคราะห์แหล่งกักต่อน้ำ  
ตาราง ผลการวิเคราะห์แหล่งกักต่อน้ำ (เก็บตัวอย่างวันที่ 28 พฤศจิกายน 2565)

ชนิดแหล่งกักต่อน้ำ	ปริมาณแหล่งกักต่อน้ำ (หน่วยลิตร)					
	22117363-1	22117363-2	22117363-3	22117363-4	22117363-5	22117363-6
Phylum Protozoa						
Subphylum Plasmmodroma						
Class Sarcodina						
Subclass Rhizopoda						
Order Testacida						
Family Arcellidae						
1. Arcella sp.	12,000	42,000	26,000	-	-	-
2. Arcella vulgaris	35,000	57,000	13,000	-	-	-
Family Diffugiidae						
3. Centropyxis aculeata	-	-	13,000	14,000	-	16,000
4. Diffugia acuminata	-	-	-	-	-	16,000
5. Diffugia sp.	-	-	-	14,000	-	-
Family Euglyphidae						
6. Euglypha acanthophora	-	28,000	-	-	-	16,000



ตาราง ผลการวิเคราะห์แหล่งกักต่อน้ำสัตว์ (เก็บตัวอย่างวันที่ 28 พฤศจิกายน 2565)  
(ต่อ)

ชนิดแหล่งกักต่อน้ำสัตว์	ปริมาณแหล่งกักต่อน้ำสัตว์ (หน่วยต่อลิตร)					
	22117363-1	22117363-2	22117363-3	22117363-4	22117363-5	22117363-6
7. <i>Euglypha</i> sp.	12,000	57,000	-	-	-	-
<b>Subphylum Ciliophora</b>						
<b>Class Ciliata</b>						
<b>Subclass Holotricha</b>						
<b>Order Gymnostomatida</b>						
8. <i>Coleps</i> sp.	12,000	-	66,000	-	-	-
<b>Subclass Spirotricha</b>						
<b>Order Tintinnida</b>						
<b>Family Tintinninidae</b>						
9. <i>Tintinnidium flaviatile</i>	1,763,000	1,446,000	343,000	141,000	15,000	62,000
<b>Subclass Peritricha</b>						
<b>Order Peritrichida</b>						
10. <i>Ptycolica</i> sp.	35,000	28,000	13,000	-	-	-
<b>Phylum Rotifera</b>						
<b>Class Monogononta</b>						
<b>Order Ploima</b>						
<b>Family Brachionidae</b>						
11. <i>Amuraeopsis fissa</i>	12,000	42,000	-	14,000	-	-
12. <i>Brachionus hawaiiensis</i>	-	-	-	-	15,000	-
13. <i>Keratella cochlearis</i>	12,000	-	-	-	-	-
14. <i>Lepadella acuminata</i>	-	14,000	-	-	-	-
<b>Family Lecanidae</b>						
15. <i>Lecane aegana</i>	-	-	-	-	30,000	-
16. <i>Lecane inopinata</i>	58,000	42,000	13,000	-	15,000	-
17. <i>Lecane stichaea</i>	-	28,000	-	-	-	-
<b>Family Notommatidae</b>						
18. <i>Cephalodella gibba</i>	-	-	-	-	76,000	-

ตาราง ผลการวิเคราะห์แหล่งกักต่อน้ำสัตว์ (เก็บตัวอย่างวันที่ 28 พฤศจิกายน 2565)  
(ต่อ)

ชนิดแหล่งกักต่อน้ำสัตว์	ปริมาณแหล่งกักต่อน้ำสัตว์ (หน่วยต่อลิตร)					
	22117363-1	22117363-2	22117363-3	22117363-4	22117363-5	22117363-6
<b>Family Tricerceridae</b>						
19. <i>Trichocerca pusilla</i>	46,000	28,000	-	-	-	-
20. <i>Trichocerca</i> sp.	-	14,000	-	-	-	-
<b>Family Asplanchnidae</b>						
21. <i>Asplanchna</i> sp.	-	-	-	-	45,000	16,000
<b>Family Synchaetidae</b>						
22. <i>Polyarthra dolichoptera</i>	23,000	28,000	-	-	-	-
23. <i>Polyarthra vulgaris</i>	-	-	-	-	15,000	-
<b>Order Flosculariacea</b>						
<b>Family Flosculariidae</b>						
24. <i>Pygura pectinifera</i>	-	-	-	-	-	16,000
<b>Class Digononta</b>						
<b>Family Philodinidae</b>						
25. <i>Rotaria rotatoria</i>	-	-	-	-	15,000	16,000
<b>Phylum Arthropoda</b>						
<b>Class Crustacea</b>						
<b>Subclass Copepoda</b>						
26. Copepod nauplius	-	-	13,000	28,000	-	-
<b>Order Cyclopoida</b>						
27. Cyclopoid copepod	-	-	-	14,000	-	-
<b>ชนิดแหล่งกักต่อน้ำสัตว์</b>	11	13	8	6	8	7
<b>ปริมาณแหล่งกักต่อน้ำสัตว์</b>	2,020,000	1,854,000	500,000	225,000	226,000	158,000
<b>ดัชนีความหลากหลายแหล่งกักต่อน้ำสัตว์</b>	0.6506	1.0558	1.1540	1.2434	1.8560	1.7585
<b>ดัชนีความเท่าเทียมแหล่งกักต่อน้ำสัตว์</b>	0.2713	0.4116	0.5550	0.6940	0.8925	0.9037

**Sample Location :**

1. สถานี 22117363-1 : แม่น้ำปลัก : เหนือจุดสูบน้ำ ของโครงการโรงไฟฟ้าหนองแสง 200 เมตร
2. สถานี 22117363-2 : แม่น้ำปลัก : จุดสูบน้ำ ของโครงการโรงไฟฟ้าหนองแสง
3. สถานี 22117363-3 : แม่น้ำปลัก : ท้ายจุดสูบน้ำ ของโครงการโรงไฟฟ้าหนองแสง 200 เมตร
4. สถานี 22117363-4 : คลองห้วยบ่า (คลองหนองงูเห่า) : เหนือจุดระบายน้ำทิ้ง ของโครงการโรงไฟฟ้าหนองแสง ขึ้นไป 500 เมตร
5. สถานี 22117363-5 : คลองห้วยบ่า (คลองหนองงูเห่า) : จุดระบายน้ำทิ้งของโรงไฟฟ้าหนองแสง
6. สถานี 22117363-6 : คลองห้วยบ่า (คลองหนองงูเห่า) : ท้ายจุดระบายน้ำทิ้งของโครงการโรงไฟฟ้าหนองแสง ลงไป 500 เมตร

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

*Chai Yotak*

(นางสาวกนกวรรณ ขาวอ่อน)

ผู้วิเคราะห์

*Chai Yotak*

(นายอลงกต อินทรชาติ)

หัวหน้าสถานีวิจัยประมงศรีราชา



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

Client : Gulf JP NS Co., Ltd.

Address : 36 Moo 4 Nong Kob, Nong Saeng, Saraburi, Thailand, 18170

Project Name : Monitoring EIA

Project Location : GNS

**รายงานผลการวิเคราะห์สัตว์น้ำดิน**

ตาราง ผลการวิเคราะห์สัตว์น้ำดิน (เก็บตัวอย่างวันที่ 28 พฤศจิกายน 2565)

ชนิดสัตว์น้ำดิน	ปริมาณสัตว์น้ำดิน (ตัวต่อตารางเมตร)					
	2243367-1	2243367-2	2243367-3	2243367-4	2243367-5	2243367-6
Phylum Arthropoda						
Class Insecta						
Order Diptera						
Family Chironomidae						
<i>Chironomus</i> sp. (หนอนแดง)	60	60	-	-	45	-
Phylum Mollusca						
Class Gastropoda						
Order Architenioglossa						
Family Bithyniidae						
<i>Bithynia</i> sp. (หอยไซ)	119	60	-	-	-	-
ชนิดสัตว์น้ำดิน	2	2	-	-	1	-
ปริมาณสัตว์น้ำดิน	179	120	-	-	45	-
ค่าดัชนีความหลากหลายสัตว์น้ำดิน	0.6378	0.6931	-	-	0.0000	-

Sample Location : 1. สถานี 2243367-1 : แม่น้ำป่าสัก : เหนือจุดสูบน้ำของโครงการ โรงไฟฟ้าหนองแซง 200 เมตร  
2. สถานี 2243367-2 : แม่น้ำป่าสัก : จุดสูบน้ำของโครงการ โรงไฟฟ้าหนองแซง  
3. สถานี 2243367-3 : แม่น้ำป่าสัก : ท้ายจุดสูบน้ำของโครงการ โรงไฟฟ้าหนองแซง 200 เมตร  
4. สถานี 2243367-4 : คลองหัวบ่ (คลองหนองงูเห่ล้อม) : เหนือจุดระบายน้ำทิ้งของโครงการ  
โรงไฟฟ้าหนองแซงขึ้นไป 500 เมตร  
5. สถานี 2243367-5 : คลองหัวบ่ (คลองหนองงูเห่ล้อม) : จุดระบายน้ำทิ้งของโรงไฟฟ้า  
หนองแซง  
6. สถานี 2243367-6 : คลองหัวบ่ (คลองหนองงูเห่ล้อม) : ท้ายจุดระบายน้ำทิ้งของโครงการ  
โรงไฟฟ้าหนองแซงลงไป 500 เมตร

Condition of Sample : contained in one plastic zip bag

นางสาว ปิยะพร  
.....  
(นายอรอุต ภัณฑรักษ์)  
ผู้วิเคราะห์

.....  
(นายอลงกต อินทรชาติ)  
หัวหน้าสถานีวิจัยประมงศรีราชา



ภาคผนวก ค-10

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ระดับเสียงเฉลี่ยที่พนักงานได้รับสัมผัส (Noise Dose (TWA))



## Analysis / Test Report

Client : Gulf JP NS Co., Ltd.  
36 Moo 4, Nong Koo, Nong Saeng, Saraburi Thailand 18170  
P/O : สัญญาที่ 4600001478  
Project Name : Monitoring EIA  
Project Location : GNS

**Lot ID: 22116295**  
Date Received : Nov 04, 2022  
Date Reported : Nov 08, 2022  
Report Number : 2440007-1

Page 1 of 10

Sample Number	22116295-1	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Sampled Date	Nov 03, 2022	Noise Dose								
Sample Description	พนักงานในโครงการก่อสร้างโรงงานไฟฟ้า พลังงาน Operation 1									
Location	ภาคเหนือ อำเภอ									
Personal Sampling	ภาคเหนือ อำเภอ									
Date Analysis Commenced	Nov 07, 2022									
Analyte										
Air Testing										
Noise Dose (12 hrs.) (Calculated from Lavg)	07:00 AM - 07:00 PM	%	-	-	-	3.6	No Standard	MOL, Department Labour Protection and Welfare (B.E.2561)	MOL	Bangkok
Noise Dose (8 hrs.)	07:00 AM - 07:00 PM	%	-	-	1	3.5	No Standard	MOL, Department Labour Protection and Welfare (B.E.2561)	MOL	Bangkok
TWA (12 hrs.) (Calculated from Lavg)	07:00 AM - 07:00 PM	dB(A)	-	-	-	68.6	83*	MOL, Department Labour Protection and Welfare (B.E.2561)	MOL	Bangkok
TWA (8 hrs.)	07:00 AM - 07:00 PM	dB(A)	-	-	-	70.4	85	MOL, Department Labour Protection and Welfare (B.E.2561)	MOL	Bangkok

### Guideline :

1. Notification of Department Labour Protection and Welfare on the Criteria and Procedures for Measurement and Analysis of Working Conditions in relation to Heat, Light or Noise Levels, including Duration and Types of Business that must perform (B.E. 2561)
2. Notification of Department of Labour Protection and Welfare on the Standard of Time Weighted Average (TWA) Noise Level (B.E. 2561)

\* MOL: Recommended guideline limit for 12 working hours should not be over 83 dB(A)

Sampled By : Arnt Srisen

Remark :

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

Approved by   
Wichan Choonharat  
Assistant Manager

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## Analysis / Test Report

Client : Gulf JP NS Co., Ltd.  
36 Moo 4, Nong Koo, Nong Saeng, Saraburi Thailand 18170  
P/O : สัญญาที่ 4600001478  
Project Name : Monitoring EIA  
Project Location : GNS

**Lot ID: 22116295**  
Date Received : Nov 04, 2022  
Date Reported : Nov 08, 2022  
Report Number : 2440007-1

Page 2 of 10

Sample Number	22116295-2	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Sampled Date	Nov 03, 2022	Noise Dose								
Sample Description	พนักงานในโครงการก่อสร้างโรงงานไฟฟ้า พลังงาน Operation 2									
Location	ภาคเหนือ อำเภอ									
Personal Sampling	ภาคเหนือ อำเภอ									
Date Analysis Commenced	Nov 07, 2022									
Analyte										
Air Testing										
Noise Dose (12 hrs.) (Calculated from Lavg)	07:00 AM - 07:00 PM	%	-	-	-	47.9	No Standard	MOL, Department Labour Protection and Welfare (B.E.2561)	MOL	Bangkok
Noise Dose (8 hrs.)	07:00 AM - 07:00 PM	%	-	-	1	44.7	No Standard	MOL, Department Labour Protection and Welfare (B.E.2561)	MOL	Bangkok
TWA (12 hrs.) (Calculated from Lavg)	07:00 AM - 07:00 PM	dB(A)	-	-	-	79.8	83*	MOL, Department Labour Protection and Welfare (B.E.2561)	MOL	Bangkok
TWA (8 hrs.)	07:00 AM - 07:00 PM	dB(A)	-	-	-	81.5	85	MOL, Department Labour Protection and Welfare (B.E.2561)	MOL	Bangkok

### Guideline :

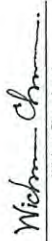
1. Notification of Department Labour Protection and Welfare on the Criteria and Procedures for Measurement and Analysis of Working Conditions in relation to Heat, Light or Noise Levels, including Duration and Types of Business that must perform (B.E. 2561)
2. Notification of Department of Labour Protection and Welfare on the Standard of Time Weighted Average (TWA) Noise Level (B.E. 2561)

\* MOL: Recommended guideline limit for 12 working hours should not be over 83 dB(A)

Sampled By : Arnt Srisen

Remark :

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

Approved by   
Wichan Choonharat  
Assistant Manager

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## Analysis / Test Report

Client : Gulf JP NS Co., Ltd.  
36 Moo 4, Nong Kob, Nong Saeng, Saraburi Thailand 18170  
P/O : 4600001478  
Project Name : Monitoring EIA  
Project Location : GNS

**Lot ID: 22116295**  
Date Received : Nov 04, 2022  
Date Reported : Nov 08, 2022  
Report Number : 2440007-1

Page 3 of 10

Sample Number	22116295-3									
Sampled Date	Nov 03, 2022									
Sample Description	Noise Dose									
Location	พนักงานขับรถในโรงงานไฟฟ้า พลังงาน Operation 3									
Personal Sampling	อุปกรณ์ส่งสัญญาณ									
Date Analysis Commenced	Nov 07, 2022									
Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location	
Air Testing	Noise Dose (12 hrs.) (Calculated from Lavg)	07:00 AM - 07:00 PM	%	-	8.3	No Standard	MOL, Department Labour Protection and Welfare (B.E.2561)	MOL	Bangkok	
		07:00 AM - 07:00 PM	%	-	1	7.8	No Standard	MOL, Department Labour Protection and Welfare (B.E.2561)	MOL	Bangkok
	TWA (12 hrs.) (Calculated from Lavg)	07:00 AM - 07:00 PM	dB(A)	-	-	72.2	83*	MOL, Department Labour Protection and Welfare (B.E.2561)	MOL	Bangkok
		07:00 AM - 07:00 PM	dB(A)	-	-	73.9	85	MOL, Department Labour Protection and Welfare (B.E.2561)	MOL	Bangkok

### Guideline :

MOL : 1. Notification of Department Labour Protection and Welfare on the Criteria and Procedures for Measurement and Analysis of Working Conditions in relation to Heat, Light or Noise Levels, including Duration and Types of Business that must perform (B.E. 2561)  
2. Notification of Department of Labour Protection and Welfare on the Standard of Time Weighted Average (TWA) Noise Level (B.E. 2561)

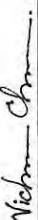
\* MOL: Recommended guideline limit for 12 working hours should not be over 83 dB(A)

Sampled By : Arit Srisen

Remark :

- LOD : Limit of Detection  
- \* < : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)

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Wichan Choonharat  
Assistant Manager

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## Analysis / Test Report

Client : Gulf JP NS Co., Ltd.  
36 Moo 4, Nong Kob, Nong Saeng, Saraburi Thailand 18170  
P/O : 4600001478  
Project Name : Monitoring EIA  
Project Location : GNS

**Lot ID: 22116295**  
Date Received : Nov 04, 2022  
Date Reported : Nov 08, 2022  
Report Number : 2440007-1

Page 4 of 10

Sample Number	22116295-4									
Sampled Date	Nov 03, 2022									
Sample Description	Noise Dose									
Location	พนักงานขับรถในโรงงานไฟฟ้า พลังงาน Operation 4									
Personal Sampling	พนักงานขับรถในโรงงานไฟฟ้า พลังงาน Operation 4									
Date Analysis Commenced	Nov 07, 2022									
Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location	
Air Testing	Noise Dose (12 hrs.) (Calculated from Lavg)	07:00 AM - 07:00 PM	%	-	67.6	No Standard	MOL, Department Labour Protection and Welfare (B.E.2561)	MOL	Bangkok	
	Noise Dose (8 hrs.)	07:00 AM - 07:00 PM	%	-	64.6	No Standard	MOL, Department Labour Protection and Welfare (B.E.2561)	MOL	Bangkok	
TWA (12 hrs.) (Calculated from Lavg)	07:00 AM - 07:00 PM	dB(A)	-	-	81.3	83*	MOL, Department Labour Protection and Welfare (B.E.2561)	MOL	Bangkok	
TWA (8 hrs.)	07:00 AM - 07:00 PM	dB(A)	-	-	83.1	85	MOL, Department Labour Protection and Welfare (B.E.2561)	MOL	Bangkok	

### Guideline :

MOL : 1. Notification of Department Labour Protection and Welfare on the Criteria and Procedures for Measurement and Analysis of Working Conditions in relation to Heat, Light or Noise Levels, including Duration and Types of Business that must perform (B.E. 2561)  
2. Notification of Department of Labour Protection and Welfare on the Standard of Time Weighted Average (TWA) Noise Level (B.E. 2561)

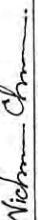
\* MOL: Recommended guideline limit for 12 working hours should not be over 83 dB(A)

Sampled By : Arit Srisen

Remark :

- LOD : Limit of Detection  
- \* < : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)

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Assistant Manager

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## Analysis / Test Report

Client : Gulf JP NS Co., Ltd.  
36 Moo 4, Nong Koo, Nong Saeng, Saraburi Thailand 18170  
P/O : 4600001478  
Project Name : Monitoring EIA  
Project Location : GNS

**Lot ID: 22116295**  
Date Received : Nov 04, 2022  
Date Reported : Nov 08, 2022  
Report Number : 2440007-1

Page 5 of 10

Sample Number	22116295-5	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Sample Description	Noise Dose									
Location	พื้นที่บริเวณโครงการก่อสร้างโรงงานไฟฟ้า พลังงาน Operation 5									
Personal Sampling	ค่าเฉลี่ย 4 ชั่วโมง									
Date Analysis Commenced	Nov 07, 2022									
Analyte										
<b>Air Testing</b>										
Noise Dose (12 hrs.) (Calculated from Law)	07:00 AM - 07:00 PM	%	-	-	-	15.8	No Standard	MOL, Department Labour Protection and Welfare (B.E.2561)	MOL	Bangkok
Noise Dose (8 hrs.)	07:00 AM - 07:00 PM	%	-	-	1	15.1	No Standard	MOL, Department Labour Protection and Welfare (B.E.2561)	MOL	Bangkok
TWA (12 hrs.) (Calculated from Law)	07:00 AM - 07:00 PM	dB(A)	-	-	-	75.0	83*	MOL, Department Labour Protection and Welfare (B.E.2561)	MOL	Bangkok
TWA (8 hrs.)	07:00 AM - 07:00 PM	dB(A)	-	-	-	76.8	85	MOL, Department Labour Protection and Welfare (B.E.2561)	MOL	Bangkok

**Guideline :**  
MOL : 1. Notification of Department Labour Protection and Welfare on the Criteria and Procedures for Measurement and Analysis of Working Conditions in relation to Heat, Light or Noise Levels, including Duration and Types of Business that must perform (B.E. 2561)  
2. Notification of Department of Labour Protection and Welfare on the Standard of Time Weighted Average (TWA) Noise Level (B.E. 2561)  
\* MOL: Recommended guideline limit for 12 working hours should not be over 83 dB(A)

**Sampled By :** Arit Srisen  
**Remark :**  
- LOD : Limit of Detection  
- "<" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)

Approved by   
Wichan Choonharat  
Assistant Manager

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## Analysis / Test Report

Client : Gulf JP NS Co., Ltd.  
36 Moo 4, Nong Koo, Nong Saeng, Saraburi Thailand 18170  
P/O : 4600001478  
Project Name : Monitoring EIA  
Project Location : GNS


**Lot ID: 22116295**  
Date Received : Nov 04, 2022  
Date Reported : Nov 08, 2022  
Report Number : 2440007-1

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Sample Number	22116295-6	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Sample Description	Noise Dose									
Location	พื้นที่บริเวณโครงการก่อสร้างโรงงานไฟฟ้า พลังงาน Maintenance 1									
Personal Sampling	ค่าเฉลี่ย 4 ชั่วโมง									
Date Analysis Commenced	Nov 07, 2022									
Analyte										
<b>Air Testing</b>										
Noise Dose (8 hrs.)	08:00 AM - 04:00 PM	%	-	-	1	2.0	No Standard	MOL, Department Labour Protection and Welfare (B.E.2561)	MOL	Bangkok
TWA (8 hrs.)	08:00 AM - 04:00 PM	dB(A)	-	-	-	68.1	85	MOL, Department Labour Protection and Welfare (B.E.2561)	MOL	Bangkok

**Guideline :**  
MOL : 1. Notification of Department Labour Protection and Welfare on the Criteria and Procedures for Measurement and Analysis of Working Conditions in relation to Heat, Light or Noise Levels, including Duration and Types of Business that must perform (B.E. 2561)  
2. Notification of Department of Labour Protection and Welfare on the Standard of Time Weighted Average (TWA) Noise Level (B.E. 2561)

**Sampled By :** Arit Srisen  
**Remark :**  
- LOD : Limit of Detection  
- "<" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)

Approved by   
Wichan Choonharat  
Assistant Manager

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NIGHT SOLUTIONS NIGHT PARTIES

1179-31/PM



## Analysis / Test Report

Client : Gulf JP NS Co., Ltd.  
36 Moo 4, Nong Kob, Nong Saeng, Saraburi Thailand 18170  
P/O : 4600001478  
Project Name : Monitoring EIA  
Project Location : GNS

**Lot ID: 22116295**  
Date Received : Nov 04, 2022  
Date Reported : Nov 08, 2022  
Report Number : 2440007-1

Page 7 of 10

Sample Number	22116295-7								
Sampled Date	Nov 03, 2022								
Sample Description	Noise Dose								
Location	พนักงานเก็บขยะมูลฝอยบริเวณซอยพลา พลังงาน Maintenance 2								
Personal Sampling	ภาคใต้-ฟุต #8								
Date Analysis Commenced	Nov 07, 2022								
Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Noise Dose (8 hrs.)	08:00 AM - 04:00 PM	%	-	1	<1	No Standard	MOL, Department Labour Protection and Welfare (B.E.2561)	MOL	Bangkok
TWA (8 hrs.)	08:00 AM - 04:00 PM	dB(A)	-	-	63.2	85	MOL, Department Labour Protection and Welfare (B.E.2561)	MOL	Bangkok


### Guideline :

- MOL : 1. Notification of Department Labour Protection and Welfare on the Criteria and Procedures for Measurement and Analysis of Working Conditions in relation to Heat, Light or Noise Levels, including Duration and Types of Business that must perform (B.E. 2561)  
2. Notification of Department of Labour Protection and Welfare on the Standard of Time Weighted Average (TWA) Noise Level (B.E. 2561)

**Sampled By :** Arit Srisen

### Remark :

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

Approved by   
Wichan Choonharat  
Assistant Manager

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LIFE SCIENCE NIGHT SOLUTIONS

11799-311 DML



## Analysis / Test Report

Client : Gulf JP NS Co., Ltd.  
36 Moo 4, Nong Kob, Nong Saeng, Saraburi Thailand 18170  
P/O : 4600001478  
Project Name : Monitoring EIA  
Project Location : GNS

**Lot ID: 22116295**  
Date Received : Nov 04, 2022  
Date Reported : Nov 08, 2022  
Report Number : 2440007-1

Page 8 of 10

Sample Number	22116295-8									
Sampled Date	Nov 03, 2022									
Sample Description	Noise Dose									
Location	พนักงานเก็บขยะมูลฝอยบริเวณซอยพลา พลังงาน Maintenance 3									
Personal Sampling	ภาคใต้-ฟุต ประตู									
Date Analysis Commenced	Nov 07, 2022									
Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location	
Air Testing										
Noise Dose (8 hrs.)	08:00 AM - 04:00 PM	%	-	1	2.0	No Standard	MOL, Department Labour Protection and Welfare (B.E.2561)	MOL	Bangkok	
TWA (8 hrs.)	08:00 AM - 04:00 PM	dB(A)	-	-	68.0	85	MOL, Department Labour Protection and Welfare (B.E.2561)	MOL	Bangkok	

### Guideline :

- MOL : 1. Notification of Department Labour Protection and Welfare on the Criteria and Procedures for Measurement and Analysis of Working Conditions in relation to Heat, Light or Noise Levels, including Duration and Types of Business that must perform (B.E. 2561)  
2. Notification of Department of Labour Protection and Welfare on the Standard of Time Weighted Average (TWA) Noise Level (B.E. 2561)

**Sampled By :** Arit Srisen

### Remark :

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

Approved by   
Wichan Choonharat  
Assistant Manager

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LIFE SCIENCE NIGHT SOLUTIONS

11799-311 DML





## Analysis / Test Report

Client : Gulf JP NS Co., Ltd.  
36 Moo 4, Nong Kob, Nong Saeng, Saraburi Thailand 18170  
P/O : 4600001478  
Project Name : Monitoring EIA  
Project Location : GNS

**Lot ID: 22116295**  
Date Received : Nov 04, 2022  
Date Reported : Nov 08, 2022  
Report Number : 2440007-1

Page 9 of 10

Sample Number	22116295-9							
Sampled Date	Nov 03, 2022							
Sample Description	Noise Dose							
Location	พนักงานในเครื่องจักรและโรงไฟฟ้า พนักงาน Maintenance 4							
Personal Sampling	คุณชานนท์ สุทธิ							
Date Analysis Commenced	Nov 07, 2022							
Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline Testing Location	
Air Testing								
Noise Dose (8 hrs.)	08:00 AM - 04:00 PM	%	-	1	<1	No Standard	MOL, Department Labour Protection and Welfare (B.E.2561)	Bangkok
TWA (8 hrs.)	08:00 AM - 04:00 PM	dB(A)	-	-	58.7	85	MOL, Department Labour Protection and Welfare (B.E.2561)	Bangkok

### Guideline :

MOL : 1. Notification of Department Labour Protection and Welfare on the Criteria and Procedures for Measurement and Analysis of Working Conditions in relation to Heat, Light or Noise Levels, including Duration and Types of Business that must perform (B.E. 2561)  
2. Notification of Department of Labour Protection and Welfare on the Standard of Time Weighted Average (TWA) Noise Level (B.E. 2561)

**Sampled By :** Arit Srisen

Remark :

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

Approved by   
Wichan Choonharat  
Assistant Manager

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1179-2/J ENL



## Analysis / Test Report

Client : Gulf JP NS Co., Ltd.  
36 Moo 4, Nong Kob, Nong Saeng, Saraburi Thailand 18170  
P/O : 4600001478  
Project Name : Monitoring EIA  
Project Location : GNS

**Lot ID: 22116295**  
Date Received : Nov 04, 2022  
Date Reported : Nov 08, 2022  
Report Number : 2440007-1

Page 10 of 10

Sample Number	22116295-10							
Sampled Date	Nov 03, 2022							
Sample Description	Noise Dose							
Location	พนักงานในเครื่องจักรและโรงไฟฟ้า พนักงาน Maintenance 5							
Personal Sampling	คุณจิรา ไข่มุกดี							
Date Analysis Commenced	Nov 07, 2022							
Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Testing Location
Air Testing								
Noise Dose (8 hrs.)	08:00 AM - 04:00 PM	%	-	1	4.2	No Standard	MOL, Department Labour Protection and Welfare (B.E.2561)	Bangkok
TWA (8 hrs.)	08:00 AM - 04:00 PM	dB(A)	-	-	71.2	85	MOL, Department Labour Protection and Welfare (B.E.2561)	Bangkok

### Guideline :

MOL : 1. Notification of Department Labour Protection and Welfare on the Criteria and Procedures for Measurement and Analysis of Working Conditions in relation to Heat, Light or Noise Levels, including Duration and Types of Business that must perform (B.E. 2561)  
2. Notification of Department of Labour Protection and Welfare on the Standard of Time Weighted Average (TWA) Noise Level (B.E. 2561)

**Sampled By :** Arit Srisen

Remark :

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

Approved by   
Wichan Choonharat  
Assistant Manager

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1179-2/J ENL



## Analysis / Test Report

Client : Gulf JP NS Co., Ltd.  
36 Moo 4, Nong Kob, Nong Saeng, Saraburi Thailand 18170  
P/O : 4099นาสง4600001478  
Project Name : Monitoring EIA  
Project Location : GNS

**Lot ID: 2270904**  
Date Received : Aug 08, 2022  
Date Reported : Aug 09, 2022  
Report Number : 2338414-1

Page 1 of 10

Sample Number	2270904-1								
Sampled Date	Aug 04, 2022								
Sample Description	Noise Dose								
Location	พนักงานในกิจกรรมการก่อสร้างโรงไฟฟ้า พนักงาน Operation 1								
Personal Sampling	กลุ่มค่า จักรยาน								
Date Analysis Commenced	Aug 09, 2022								
Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing	Noise Dose (12 hrs.) (Calculated from Lavg)	%	-	-	37.2	No Standard	MOL, Department Labour Protection and Welfare (B.E.2561)	MOL	Bangkok
	Noise Dose (8 hrs.)	%	-	1	34.7	No Standard	MOL, Department Labour Protection and Welfare (B.E.2561)	MOL	Bangkok
TWA (12 hrs.) (Calculated from Lavg)		dB(A)	-	-	78.7	83*	MOL, Department Labour Protection and Welfare (B.E.2561)	MOL	Bangkok
TWA (8 hrs.)		dB(A)	-	-	80.4	85	MOL, Department Labour Protection and Welfare (B.E.2561)	MOL	Bangkok

### Guideline :


MOL : 1. Notification of Department Labour Protection and Welfare on the Criteria and Procedures for Measurement and Analysis of Working Conditions in relation to Heat, Light or Noise Levels, including Duration and Types of Business that must perform (B.E. 2561)  
2. Notification of Department of Labour Protection and Welfare on the Standard of Time Weighted Average (TWA) Noise Level (B.E. 2561)  
\* MOL: Recommended guideline limit for 12 working hours should not be over 83 dB(A)

Sampled By : Warakorn Pookrak

Remark :

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

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Assistant Manager

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LIFE SCIENCES NIGHT SOLUTIONS

11799-21/FINAL



## Analysis / Test Report

Client : Gulf JP NS Co., Ltd.  
36 Moo 4, Nong Kob, Nong Saeng, Saraburi Thailand 18170  
P/O : 4099นาสง4600001478  
Project Name : Monitoring EIA  
Project Location : GNS

**Lot ID: 2270904**  
Date Received : Aug 08, 2022  
Date Reported : Aug 09, 2022  
Report Number : 2338414-1

Page 2 of 10

Sample Number	2270904-2									
Sampled Date	Aug 04, 2022									
Sample Description	Noise Dose									
Location	พนักงานในกิจกรรมการก่อสร้างโรงไฟฟ้า พนักงาน Operation 2									
Personal Sampling	กลุ่มค่า จักรยาน									
Date Analysis Commenced	Aug 09, 2022									
Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location	
Air Testing	Noise Dose (12 hrs.) (Calculated from Lavg)	%	-	-	32.4	No Standard	MOL, Department Labour Protection and Welfare (B.E.2561)	MOL	Bangkok	
	Noise Dose (8 hrs.)	%	-	1	30.2	No Standard	MOL, Department Labour Protection and Welfare (B.E.2561)	MOL	Bangkok	
	TWA (12 hrs.) (Calculated from Lavg)	dB(A)	-	-	78.1	83*	MOL, Department Labour Protection and Welfare (B.E.2561)	MOL	Bangkok	
	TWA (8 hrs.)	dB(A)	-	-	79.8	85	MOL, Department Labour Protection and Welfare (B.E.2561)	MOL	Bangkok	

### Guideline :


MOL : 1. Notification of Department Labour Protection and Welfare on the Criteria and Procedures for Measurement and Analysis of Working Conditions in relation to Heat, Light or Noise Levels, including Duration and Types of Business that must perform (B.E. 2561)  
2. Notification of Department of Labour Protection and Welfare on the Standard of Time Weighted Average (TWA) Noise Level (B.E. 2561)  
\* MOL: Recommended guideline limit for 12 working hours should not be over 83 dB(A)

Sampled By : Warakorn Pookrak

Remark :

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

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## Analysis / Test Report

Client : Gulf JP NS Co., Ltd.  
36 Moo 4, Nong Kob, Nong Saeng, Saraburi Thailand 18170  
P/O : กรุงเทพมหานคร 10600001478  
Project Name : Monitoring EIA  
Project Location : GNS

Lot ID: 2270904  
Date Received : Aug 08, 2022  
Date Reported : Aug 09, 2022  
Report Number : 2338414-1

Page 5 of 10

Sample Number	2270904-5									
Sampled Date	Aug 04, 2022									
Sample Description	Noise Dose									
Location	พลาซ่าศูนย์การค้าเดอะไนน์ซีอีโอ อาคารพาณิชย์ 5									
Personal Sampling	บริเวณทางเข้าอาคาร									
Date Analysis Commenced	Aug 09, 2022									
Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location	
Air Testing										
Noise Dose (12 hrs.) (Calculated from Lavg)	07:00 AM - 07:00 PM	%	-	-	19.5	No Standard	MOL, Department Labour Protection and Welfare (B.E.2561)	MOL	Bangkok	
Noise Dose (8 hrs.) (Calculated from Lavg)	07:00 AM - 07:00 PM	%	-	1	18.6	No Standard	MOL, Department Labour Protection and Welfare (B.E.2561)	MOL	Bangkok	
TWA (12 hrs.) (Calculated from Lavg)	07:00 AM - 07:00 PM	dB(A)	-	-	75.9	83*	MOL, Department Labour Protection and Welfare (B.E.2561)	MOL	Bangkok	
TWA (8 hrs.)	07:00 AM - 07:00 PM	dB(A)	-	-	77.7	85	MOL, Department Labour Protection and Welfare (B.E.2561)	MOL	Bangkok	

### Guideline :


1. Notification of Department Labour Protection and Welfare on the Criteria and Procedures for Measurement and Analysis of Working Conditions in relation to Heat, Light or Noise Levels, including Duration and Types of Business that must perform (B.E. 2561)
2. Notification of Department of Labour Protection and Welfare on the Standard of Time Weighted Average (TWA) Noise Level (B.E. 2561)

Sampled By : Warakorn Pookrak

Remark :

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

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Assistant Manager

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NIGHT SOLUTIONS

1379-31/BNAL



## Analysis / Test Report

Client : Gulf JP NS Co., Ltd.  
36 Moo 4, Nong Kob, Nong Saeng, Saraburi Thailand 18170  
P/O : กรุงเทพมหานคร 10600001478  
Project Name : Monitoring EIA  
Project Location : GNS

Lot ID: 2270904  
Date Received : Aug 08, 2022  
Date Reported : Aug 09, 2022  
Report Number : 2338414-1

Page 6 of 10

Sample Number	2270904-6									
Sampled Date	Aug 04, 2022									
Sample Description	Noise Dose									
Location	พื้นที่บริเวณกิจกรรมการก่อสร้างรถไฟฟ้า รถไฟฟ้าสาย 1									
Personal Sampling	บุคลากรในพื้นที่									
Date Analysis Commenced	Aug 09, 2022									
Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location	
Air Testing										
Noise Dose (8 hrs.)	08:00 AM - 04:00 PM	%	-	1	2.0	No Standard	MOL, Department Labour Protection and Welfare (B.E.2561)	MOL	Bangkok	
TWA (8 hrs.)	08:00 AM - 04:00 PM	dB(A)	-	-	68.0	85	MOL, Department Labour Protection and Welfare (B.E.2561)	MOL	Bangkok	

### Guideline :


1. Notification of Department Labour Protection and Welfare on the Criteria and Procedures for Measurement and Analysis of Working Conditions in relation to Heat, Light or Noise Levels, including Duration and Types of Business that must perform (B.E. 2561)
2. Notification of Department of Labour Protection and Welfare on the Standard of Time Weighted Average (TWA) Noise Level (B.E. 2561)

Sampled By : Warakorn Pookrak

Remark :

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

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Approved by   
Wichan Choonharat  
Assistant Manager

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NIGHT SOLUTIONS

1379-31/BNAL



## Analysis / Test Report

Client : Gulf JP NS Co., Ltd.  
36 Moo 4, Nong Kob, Nong Saeng, Saraburi Thailand 18170  
P/O : #gulfns4600001478  
Project Name : Monitoring EIA  
Date Received : Aug 08, 2022  
Date Reported : Aug 09, 2022  
Report Number : 2338414+1  
**Lot ID: 22709004**

Page 8 of 10

Sample Number	2270904-8
Sample Date	Aug 04, 2022
Sample Description	Noise Dose
Location	พิกัดบนถนนในโครงการรถไฟฟ้า รถไฟฟ้า Maintenance 3
Personal Sampling	อุปกรณ์การวัดเสียง
Date Analysis Commenced	Aug 09, 2022
Analyte	
Air Testing	
Noise Dose (8 hrs.)	08:00 AM - 04:00 PM % - 1 -<1 MOL, Department Labour Protection and Welfare (B.E.2561) MOL
TWA (8 hrs.)	08:00 AM - 04:00 PM dB(A) - - 53.2 MOL, Department Labour Protection and Welfare (B.E.2561) MOL

**Guideline:**

MOL : 1. Notification of Department Labour Protection and Welfare on the Criteria and Procedures for Measurement and Analysis of Working Conditions in relation to Heat, Light or Noise Levels, including Duration and Types of Business that must perform (B.E. 2561)

2. Notification of Department of Labour Protection and Welfare on the Standard of Time Weighted Average (TW Noise Level)

3. Notification of Department of Labour Protection and Welfare on the Standard of Time Weighted Average (TW Noise Level) (B.E. 2561)

at the University of Department of  
**Sampled By : Warakorn Pookrak**

Remark :

- LOD : Limit of Detection
- " $\mu$ " : Lower than LOD (Limit of Quantization) / LOR (Limit of Reporting)

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**Approved by**

**Wichan Choonharat**  
**Assistant Manager**

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11729-21/EMAIL





## Analysis / Test Report

**Client :** Gulf JP NS Co., Ltd.  
36 Moo 4, Nong Kob, Nong Saeng, Saraburi Thailand 18170  
**P/O :** 81ญญานนท์4600001478  
**Project Name :** Monitoring EIA  
**Project Location :** GNS

Page 10 of 10

Sample Number	22709004-10							
Sample Date	Aug 04, 2022							
Sample Description	Noise Dose							
Location	พนักงานบำรุงรักษาเครื่องจักรไฟฟ้า พนักงาน Maintenance 5							
Personal Sampling	อุปกรณ์ส่วนบุคคล							
Date Analysis Commenced	Aug 09, 2022							
Analyze	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline Testing Location
Air Testing								
Noise Dose (8 hrs.)	08:00 AM - 04:00 PM	%	-	I	<1	No Standard	MOL, Department Labour Protection and Welfare (B.E.2561)	Bangkok
TWA (8 hrs.)	08:00 AM - 04:00 PM	(dB(A))	-	-	59.8	85	MOL, Department Labour Protection and Welfare (B.E.2561)	Bangkok

**Guideline:**  
 MOL : 1. Notification of Department Labour Protection and Welfare on the Criteria and Procedures for Measurement and Analysis of Working Conditions in relation to Heat, Light or Noise Levels, including Duration and Types of Business that must perform (B.E. 2561)  
 2. Notification of Department of Labour Protection and Welfare on the Standard of Time Weighted Average (TWA) Noise Level (B.E. 2561)  
**Sampled By :** Warakorn Poekrak

Remark :

- LOD : Limit of Detection
- " $\leq$ " : Lower than LOD (Limit of Quantitation) / LOR (Limit of Reporting)

Approved by Wichan Choonharat  
Wichan Choonharat  
Assistant Manager

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ระดับความร้อนในบริเวณการทำงาน



## Analysis / Test Report

Client : Gulf JP NS Co., Ltd.  
36 Moo 4, Nong Kob, Nong Saeng, Saraburi Thailand 18170  
P/O : 4600001478  
Project Name : Monitoring EIA  
Project Location : GNS

Lot ID: 2270908  
Date Received : Aug 05, 2022  
Date Reported : Aug 09, 2022  
Report Number: 2338419-1

Page 1 of 12

Sample Number	2270908-1				
Parameter	Heat Stress (Sampling Time : 10.00 AM - 12.00 PM)				
Measurement Date	Aug 04, 2022				
Measurement by	Warakorn Pookrak				
Location	ปล่องระบาย 1 ฝั่ง (ด้านอาคาร ปล่อยควัน :- ด้าน :- )				
Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
เครื่อง Condenser Exhaust Unit (Block1)	120	26.5	25.1	29.9	29.9
Average (WBGT)		26.5			
Guideline WBGT (°C)		34.0			

Reference Method : Wet Bulb Globe Temperature

### Guideline:

- Notification of Department Labour Protection and Welfare on the Criteria and Procedures for Measurement and Analysis of Working Conditions in relation to Heat, Light or Noise Levels, including Duration and Types of Business that must perform (B.E. 2561)
- Ministerial Regulation on Prescribing of Standard for Administration and Management of Occupational Safety, Health and Environment in relation to Heat, Light and Noise, B.E.2559

Technical Management  
Supot Salamteh  
Section Head

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## Analysis / Test Report

Client : Gulf JP NS Co., Ltd.  
36 Moo 4, Nong Kob, Nong Saeng, Saraburi Thailand 18170  
P/O : 4600001478  
Project Name : Monitoring EIA  
Project Location : GNS

Lot ID: 2270908  
Date Received : Aug 05, 2022  
Date Reported : Aug 09, 2022  
Report Number: 2338419-1

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Sample Number	2270908-2				
Parameter	Heat Stress (Sampling Time : 10.00 AM - 12.00 PM)				
Measurement Date	Aug 04, 2022				
Measurement by	Warakorn Pookrak				
Location	ปล่องระบาย 1 ฝั่ง (ด้านอาคาร ปล่อยควัน :- ด้าน :- )				
Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
ปล่องระบายไอคอนกรีต (Block1)	120	27.8	25.9	32.2	32.0
Average (WBGT)		27.8			
Guideline WBGT (°C)		34.0			

Reference Method : Wet Bulb Globe Temperature

### Guideline:

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## Analysis / Test Report

Client : Gulf JP NS Co., Ltd.  
36 Moo 4, Nong Kob, Nong Saeng, Saraburi Thailand 18170  
P/O : 4600001478  
Project Name : Monitoring EIA  
Project Location : GNS

Lot ID: 2270908  
Date Received : Aug 05, 2022  
Date Reported : Aug 09, 2022  
Report Number: 2338419-1

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Sample Number	2270908-3				
Parameter	Heat Stress (Sampling Time : 10.00 AM - 12.00 PM)				
Measurement Date	Aug 04, 2022				
Measurement by	Warakorn Pookrak				
Location	ปล่องระบาย 1 ฝั่ง (ด้านอาคาร ปล่อยควัน :- ด้าน :- )				
Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
เครื่อง Generator 11	120	27.5	25.8	31.4	31.4
Average (WBGT)		27.5			
Guideline WBGT (°C)		34.0			

Reference Method : Wet Bulb Globe Temperature

### Guideline:

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## Analysis / Test Report

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36 Moo 4, Nong Kob, Nong Saeng, Saraburi Thailand 18170  
P/O : 4600001478  
Project Name : Monitoring EIA  
Project Location : GNS

Lot ID: 2270908  
Date Received : Aug 05, 2022  
Date Reported : Aug 09, 2022  
Report Number: 2338419-1

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Sample Number	2270908-4				
Parameter	Heat Stress (Sampling Time : 10.00 AM - 12.00 PM)				
Measurement Date	Aug 04, 2022				
Measurement by	Warakorn Pookrak				
Location	ปล่องระบาย 1 ฝั่ง (ด้านอาคาร ปล่อยควัน :- ด้าน :- )				
Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
เครื่อง Generator 12	120	27.5	25.9	31.3	31.3
Average (WBGT)		27.5			
Guideline WBGT (°C)		34.0			

Reference Method : Wet Bulb Globe Temperature

### Guideline:

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## Analysis / Test Report

Client: Gulf 3P NS Co., Ltd.  
36 Moo 4, Nong Kob, Nong Saeng, Saraburi Thailand 18170  
P/O : 84949494600001478  
Project Name : Monitoring EIA  
Project Location : GNS

Lot ID: 2270908  
Date Received : Aug 05, 2022  
Date Reported : Aug 09, 2022  
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Sample Number	2270908-5				
Parameter	Heat Stress (Sampling Time : 10:00 AM - 12:00 PM)				
Measurement Date	Aug 04, 2022				
Measurement by	Warakorn Pookrak				
Location	ปล่องควัน 1 หลัง (ด้านหลังอาคาร ปล่องควัน : - มุม : -)				
Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
ปล่อง Combustion Turbine 11	120	27.1	25.5	30.9	30.9
Average (WBGT)		27.1			
Guideline WBGT (°C)		34.0			

Reference Method : Wet Bulb Globe Temperature

### Guideline:

- Notification of Department Labour Protection and Welfare on the Criteria and Procedures for Measurement and Analysis of Working Conditions in relation to Heat, Light or Noise Levels, including Duration and Types of Business that must perform (B.E. 2561)
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Technical Management

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P/O : 84949494600001478  
Project Name : Monitoring EIA  
Project Location : GNS

Lot ID: 2270908  
Date Received : Aug 05, 2022  
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Sample Number	2270908-6				
Parameter	Heat Stress (Sampling Time : 10:00 AM - 12:00 PM)				
Measurement Date	Aug 04, 2022				
Measurement by	Warakorn Pookrak				
Location	ปล่องควัน 1 หลัง (ด้านหลังอาคาร ปล่องควัน : - มุม : -)				
Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
ปล่อง Combustion Turbine 12	120	27.0	25.4	30.8	30.8
Average (WBGT)		27.0			
Guideline WBGT (°C)		34.0			

Reference Method : Wet Bulb Globe Temperature

### Guideline:

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Project Location : GNS

Lot ID: 2270908  
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Sample Number	2270908-7				
Parameter	Heat Stress (Sampling Time : 12.00 PM - 02.00 PM)				
Measurement Date	Aug 04, 2022				
Measurement by	Warakorn Pookrak				
Location	ปล่องควัน 1 หลัง (ด้านหลังอาคาร ปล่องควัน : - มุม : -)				
Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
ปล่อง Condenser Exhaust Unit (Block2)	120	27.4	26.0	30.5	30.5
Average (WBGT)		27.4			
Guideline WBGT (°C)		34.0			

Reference Method : Wet Bulb Globe Temperature

### Guideline:

- Notification of Department Labour Protection and Welfare on the Criteria and Procedures for Measurement and Analysis of Working Conditions in relation to Heat, Light or Noise Levels, including Duration and Types of Business that must perform (B.E. 2561)
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## Analysis / Test Report

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Project Name : Monitoring EIA  
Project Location : GNS

Lot ID: 2270908  
Date Received : Aug 05, 2022  
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Sample Number	2270908-8				
Parameter	Heat Stress (Sampling Time : 12:00 PM - 02:00 PM)				
Measurement Date	Aug 04, 2022				
Measurement by	Warakorn Pookrak				
Location	ปล่องควัน 1 หลัง (ด้านหลังอาคาร ปล่องควัน : - มุม : -)				
Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
ปล่องควันหลังเตา (Block2)	120	27.5	25.7	31.7	31.7
Average (WBGT)		27.5			
Guideline WBGT (°C)		34.0			

Reference Method : Wet Bulb Globe Temperature

### Guideline:

- Notification of Department Labour Protection and Welfare on the Criteria and Procedures for Measurement and Analysis of Working Conditions in relation to Heat, Light or Noise Levels, including Duration and Types of Business that must perform (B.E. 2561)
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Technical Management

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## Analysis / Test Report

Client : Gulf JP NS Co., Ltd.  
36 Moo 4, Nong Kob, Nong Saeng, Saraburi Thailand 18170  
P/O : กรุงเทพมหานคร4600001478  
Project Name : Monitoring EIA  
Project Location : GNS

Lot ID: 2270908  
Date Received : Aug 05, 2022  
Date Reported : Aug 09, 2022  
Report Number: 2338419-1

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Sample Number	2270908-9				
Parameter	Heat Stress (Sampling Time : 12.00 PM - 02.00 PM)				
Measurement Date	Aug 04, 2022				
Measurement by	Warakorn Pookrak				
Location	ปล่องควัน 1 ลูฟ (ตำแหน่งทดสอบปล่องควัน : - มุม : - )				
Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
บริเวณ Generator Z1	120	28.3	26.3	32.8	32.8
Average (WBGT)		28.3			
Guideline WBGT (°C)		34.0			

Reference Method : Wet Bulb Globe Temperature

### Guideline:

- Notification of Department Labour Protection and Welfare on the Criteria and Procedures for Measurement and Analysis of Working Conditions in relation to Heat, Light or Noise Levels, including Duration and Types of Business that must perform (B.E. 2561)
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Technical Management

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P/O : กรุงเทพมหานคร4600001478  
Project Name : Monitoring EIA  
Project Location : GNS

Lot ID: 2270908  
Date Received : Aug 05, 2022  
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Sample Number	2270908-10				
Parameter	Heat Stress (Sampling Time : 12.00 PM - 02.00 PM)				
Measurement Date	Aug 04, 2022				
Measurement by	Warakorn Pookrak				
Location	ปล่องควัน 1 ลูฟ (ตำแหน่งทดสอบปล่องควัน : - มุม : - )				
Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
บริเวณ Generator Z2	120	28.0	26.0	32.8	32.8
Average (WBGT)		28.0			
Guideline WBGT (°C)		34.0			

Reference Method : Wet Bulb Globe Temperature

### Guideline:

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Technical Management

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Project Name : Monitoring EIA  
Project Location : GNS

Lot ID: 2270908  
Date Received : Aug 05, 2022  
Date Reported : Aug 09, 2022  
Report Number: 2338419-1

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Sample Number	2270908-11				
Parameter	Heat Stress (Sampling Time : 12.00 PM - 02.00 PM)				
Measurement Date	Aug 04, 2022				
Measurement by	Warakorn Pookrak				
Location	ปล่องควัน 1 ลูฟ (ตำแหน่งทดสอบปล่องควัน : - มุม : - )				
Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
บริเวณ Combustion Turbine Z1	120	28.7	27.0	32.6	32.6
Average (WBGT)		28.7			
Guideline WBGT (°C)		34.0			

Reference Method : Wet Bulb Globe Temperature

### Guideline:

- Notification of Department Labour Protection and Welfare on the Criteria and Procedures for Measurement and Analysis of Working Conditions in relation to Heat, Light or Noise Levels, including Duration and Types of Business that must perform (B.E. 2561)
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P/O : กรุงเทพมหานคร4600001478  
Project Name : Monitoring EIA  
Project Location : GNS

Lot ID: 2270908  
Date Received : Aug 05, 2022  
Date Reported : Aug 09, 2022  
Report Number: 2338419-1

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Sample Number	2270908-12				
Parameter	Heat Stress (Sampling Time : 12.00 PM - 02.00 PM)				
Measurement Date	Aug 04, 2022				
Measurement by	Warakorn Pookrak				
Location	ปล่องควัน 1 ลูฟ (ตำแหน่งทดสอบปล่องควัน : - มุม : - )				
Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
บริเวณ Combustion Turbine Z2	120	28.0	26.1	32.5	32.5
Average (WBGT)		28.0			
Guideline WBGT (°C)		34.0			

Reference Method : Wet Bulb Globe Temperature

### Guideline:

- Notification of Department Labour Protection and Welfare on the Criteria and Procedures for Measurement and Analysis of Working Conditions in relation to Heat, Light or Noise Levels, including Duration and Types of Business that must perform (B.E. 2561)
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## Analysis / Test Report

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P/O : 8899/วสท/4600001478  
Project Name : Monitoring EIA  
Project Location : GNS

Lot ID: 22116300  
Date Received : Nov 04, 2022  
Date Reported : Nov 08, 2022  
Report Number: 2440010-1

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Sample Number	22116300-5				
Parameter	Heat Stress (Sampling Time : 12.00 PM - 02.00 PM)				
Measurement Date	Nov 03, 2022				
Measurement by	Artit Srisen				
Location	ปล่องระบาย 1 เหนือ (ต่อ-ระบบท่อ ปล่อยไอระเหย : - มุม :-)				
Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
ว/รณ Combustion Turbine 11	120	25.4	22.3	32.5	32.5
Average (WBGT)		25.4			
Guideline WBGT (°C)		34.0			

Reference Method : Wet Bulb Globe Temperature

## Guideline:

- Notification of Department Labour Protection and Welfare on the Criteria and Procedures for Measurement and Analysis of Working Conditions in relation to Heat, Light or Noise Levels, including Duration and Types of Business that must perform (B.E. 2561)
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Technical Management

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P/O : 8899/วสท/4600001478  
Project Name : Monitoring EIA  
Project Location : GNS

Lot ID: 22116300  
Date Received : Nov 04, 2022  
Date Reported : Nov 08, 2022  
Report Number: 2440010-1

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Sample Number	22116300-6				
Parameter	Heat Stress (Sampling Time : 12.00 PM - 02.00 PM)				
Measurement Date	Nov 03, 2022				
Measurement by	Artit Srisen				
Location	ปล่องระบาย 1 เหนือ (ต่อ-ระบบท่อ ปล่อยไอระเหย : - มุม :-)				
Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
ว/รณ Combustion Turbine 12	120	26.3	23.8	32.2	32.2
Average (WBGT)		26.3			
Guideline WBGT (°C)		34.0			

Reference Method : Wet Bulb Globe Temperature

## Guideline:

- Notification of Department Labour Protection and Welfare on the Criteria and Procedures for Measurement and Analysis of Working Conditions in relation to Heat, Light or Noise Levels, including Duration and Types of Business that must perform (B.E. 2561)
- Ministerial Regulation on Prescribing of Standard for Administration and Management of Occupational Safety, Health and Environment in relation to Heat, Light and Noise, B.E.2559

Technical Management

*Supot S*  
Supot Salameh  
Section Head

Approved by

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Wichan Choonharat  
Assistant Manager

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## Analysis / Test Report

Client : Gulf JP NS Co., Ltd.  
36 Moo 4, Nong Kob, Nong Saeng, Saraburi Thailand 18170  
P/O : 8899/วสท/4600001478  
Project Name : Monitoring EIA  
Project Location : GNS

Lot ID: 22116300  
Date Received : Nov 04, 2022  
Date Reported : Nov 08, 2022  
Report Number: 2440010-1

Page 7 of 12

Sample Number	22116300-7				
Parameter	Heat Stress (Sampling Time : 10.00 AM - 12.00 PM)				
Measurement Date	Nov 03, 2022				
Measurement by	Artit Srisen				
Location	ปล่องระบาย 1 เหนือ (ต่อ-ระบบท่อ ปล่อยไอระเหย : - มุม :-)				
Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
ว/รณ Condenser Exhaust Unit (Block 2)	120	23.4	21.6	27.7	27.6
Average (WBGT)		23.4			
Guideline WBGT (°C)		34.0			

Reference Method : Wet Bulb Globe Temperature

## Guideline:

- Notification of Department Labour Protection and Welfare on the Criteria and Procedures for Measurement and Analysis of Working Conditions in relation to Heat, Light or Noise Levels, including Duration and Types of Business that must perform (B.E. 2561)
- Ministerial Regulation on Prescribing of Standard for Administration and Management of Occupational Safety, Health and Environment in relation to Heat, Light and Noise, B.E.2559

Technical Management

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## Analysis / Test Report

Client : Gulf JP NS Co., Ltd.  
36 Moo 4, Nong Kob, Nong Saeng, Saraburi Thailand 18170  
P/O : 8899/วสท/4600001478  
Project Name : Monitoring EIA  
Project Location : GNS

Lot ID: 22116300  
Date Received : Nov 04, 2022  
Date Reported : Nov 08, 2022  
Report Number: 2440010-1

Page 8 of 12

Sample Number	22116300-8				
Parameter	Heat Stress (Sampling Time : 10.00 AM - 12.00 PM)				
Measurement Date	Nov 03, 2022				
Measurement by	Artit Srisen				
Location	ปล่องระบาย 1 เหนือ (ต่อ-ระบบท่อ ปล่อยไอระเหย : - มุม :-)				
Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
ว/รณ Condenser Exhaust Unit (Block 2)	120	25.1	22.8	30.5	30.5
Average (WBGT)		25.1			
Guideline WBGT (°C)		34.0			

Reference Method : Wet Bulb Globe Temperature

## Guideline:

- Notification of Department Labour Protection and Welfare on the Criteria and Procedures for Measurement and Analysis of Working Conditions in relation to Heat, Light or Noise Levels, including Duration and Types of Business that must perform (B.E. 2561)
- Ministerial Regulation on Prescribing of Standard for Administration and Management of Occupational Safety, Health and Environment in relation to Heat, Light and Noise, B.E.2559

Technical Management

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## Analysis / Test Report

Client : Gulf JP NS Co., Ltd.  
36 Moo 4, Nong Kob, Nong Saeng, Saraburi Thailand 18170  
P/O : 4600001478  
Project Name : Monitoring EIA  
Project Location : GNS

Lot ID: 22116300  
Date Received : Nov 04, 2022  
Date Reported : Nov 08, 2022  
Report Number: 2440010-1

Page 9 of 12

Sample Number	22116300-9				
Parameter	Heat Stress (Sampling Time : 10.00 AM - 12.00 PM)				
Measurement Date	Nov 03, 2022				
Measurement by	Artik Srisen				
Location	ปล่องควัน 1 หลัง (ด้านหลังอาคาร ปล่องควัน : - หอกล : -)				
Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
Uhrin Generator 21	120	25.1	22.5	31.2	30.7
Average (WBGT)		25.1			
Guideline WBGT (°C)		34.0			

Reference Method : Wet Bulb Globe Temperature

### Guideline:

- Notification of Department Labour Protection and Welfare on the Criteria and Procedures for Measurement and Analysis of Working Conditions in relation to Heat, Light or Noise Levels, including Duration and Types of Business that must perform (B.E. 2561)
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Technical Management

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## Analysis / Test Report

Client : Gulf JP NS Co., Ltd.  
36 Moo 4, Nong Kob, Nong Saeng, Saraburi Thailand 18170  
P/O : 4600001478  
Project Name : Monitoring EIA  
Project Location : GNS

Lot ID: 22116300  
Date Received : Nov 04, 2022  
Date Reported : Nov 08, 2022  
Report Number: 2440010-1

Page 10 of 12

Sample Number	22116300-10				
Parameter	Heat Stress (Sampling Time : 10.00 AM - 12.00 PM)				
Measurement Date	Nov 03, 2022				
Measurement by	Artit Srisen				
Location	ปล่องควัน 1 หลัง (ด้านนอกอาคาร ปล่องควัน : - หอกล : -)				
Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
Uhrin Generator 22	120	25.3	23.0	30.8	30.8
Average (WBGT)		25.3			
Guideline WBGT (°C)		34.0			

Reference Method : Wet Bulb Globe Temperature

### Guideline:

- Notification of Department Labour Protection and Welfare on the Criteria and Procedures for Measurement and Analysis of Working Conditions in relation to Heat, Light or Noise Levels, including Duration and Types of Business that must perform (B.E. 2561)
- Ministerial Regulation on Prescribing of Standard for Administration and Management of Occupational Safety, Health and Environment in relation to Heat, Light and Noise, B.E. 2559

Technical Management

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## Analysis / Test Report

Client : Gulf JP NS Co., Ltd.  
36 Moo 4, Nong Kob, Nong Saeng, Saraburi Thailand 18170  
P/O : 4600001478  
Project Name : Monitoring EIA  
Project Location : GNS

Lot ID: 22116300  
Date Received : Nov 04, 2022  
Date Reported : Nov 08, 2022  
Report Number: 2440010-1

Page 11 of 12

Sample Number	22116300-11				
Parameter	Heat Stress (Sampling Time : 10.00 AM - 12.00 PM)				
Measurement Date	Nov 03, 2022				
Measurement by	Artit Srisen				
Location	ปล่องควัน 1 หลัง (ด้านนอกอาคาร ปล่องควัน : - หอกล : -)				
Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
Uhrin Combustion Turbine 21	120	25.6	23.3	30.9	30.9
Average (WBGT)		25.6			
Guideline WBGT (°C)		34.0			

Reference Method : Wet Bulb Globe Temperature

### Guideline:

- Notification of Department Labour Protection and Welfare on the Criteria and Procedures for Measurement and Analysis of Working Conditions in relation to Heat, Light or Noise Levels, including Duration and Types of Business that must perform (B.E. 2561)
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Technical Management

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## Analysis / Test Report

Client : Gulf JP NS Co., Ltd.  
36 Moo 4, Nong Kob, Nong Saeng, Saraburi Thailand 18170  
P/O : 4600001478  
Project Name : Monitoring EIA  
Project Location : GNS

Lot ID: 22116300  
Date Received : Nov 04, 2022  
Date Reported : Nov 08, 2022  
Report Number: 2440010-1

Page 12 of 12

Sample Number	22116300-12				
Parameter	Heat Stress (Sampling Time : 10.00 AM - 12.00 PM)				
Measurement Date	Nov 03, 2022				
Measurement by	Artik Srisen				
Location	ปล่องควัน 1 หลัง (ด้านนอกอาคาร ปล่องควัน : - หอกล : -)				
Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
Uhrin Combustion Turbine 22	120	25.4	23.2	30.8	30.8
Average (WBGT)		25.4			
Guideline WBGT (°C)		34.0			

Reference Method : Wet Bulb Globe Temperature

### Guideline:

- Notification of Department Labour Protection and Welfare on the Criteria and Procedures for Measurement and Analysis of Working Conditions in relation to Heat, Light or Noise Levels, including Duration and Types of Business that must perform (B.E. 2561)
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Technical Management

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## Analysis / Test Report

Client : Gulf JP NS Co., Ltd.  
 316 Moo 4, Nong Koo, Nong Saeng, Saraburi Thailand 18170  
 P/O : 44pjtuan4600001478  
 Project Name : Monitoring EIA

Page 1 of 1

Lay out No.	Reference Number	Measurement Date	Measurement Time	Spot /Area No.	Illuminance (Lux)		Guideline Limit		Comment
					Spot	Average	Spot/Min	Average	
2	2270652-1	4 Aug 2022	Day time	1	408	-	400-500	-	Pass
					409	-	400-500	-	
3	2270652-3	4 Aug 2022	Day time	1	414	-	400-500	-	Pass
					403	-	400-500	-	
6	2270652-5	4 Aug 2022	Day time	1	597	-	400-500	-	Pass
					511	-	400-500	-	
Area - Administration Building : Pantry									
12.1	2270652-7	4 Aug 2022	Day time	1	831	822.5	150	300	Pass
12.2	2270652-8	4 Aug 2022	Day time	2	814				
12.1	2270652-9	4 Aug 2022	Night time	1	516	507.5	150	300	Pass
12.2	2270652-10	4 Aug 2022	Night time	2	499				
Spot - Administration Building : Purchase Table 1									
18	2270652-11	4 Aug 2022	Day time	1	446	-	400-500	-	Pass
18	2270652-12	4 Aug 2022	Night time	1	440	-	400-500	-	Pass

**Measurement by :** Warakorn Pookrak Personnel of ALS Laboratory Group (Thailand) Co., Ltd.  
**Guideline :** Notification of Departure of Labour Protection and Welfare, B.E.2560 (2017) dated November 27, B.E.2560 (2017), and published in the Royal Government Gazette, Vol.135, Part 39D dated February 21 B.E.2561 (2018)

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Assistant Manager

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## Analysis / Test Report

Client : Gulf JP NS Co., Ltd.  
36 Moo 4, Nong Kob, Nong Saeng, Saraburi Thailand 18170  
P/O : 4600001478  
Project Name : Monitoring EIA  
Project Location : GNS

Lot ID: 2270918  
Date Received : Aug 08, 2022  
Date Reported : Aug 09, 2022  
Report Number : 2398596-1

Page 1 of 1

Lay out No.	Reference Number	Measurement Date	Measurement Time	Spot / Area No.	Illuminance (Lux) Spot	Average	Spot/Min	Guideline Limit	Comment
Spot - Workshop/Maintenance Building FL.1 : Warehouse Office Table 1									
2	2270918-1	4 Aug 2022	Day time	1	468	-	400-500	-	Pass
2	2270918-2	4 Aug 2022	Night time	1	420	-	400-500	-	Pass
Spot - Workshop/Maintenance Building FL.1 : FirstAids Room									
4	2270918-3	4 Aug 2022	Day time	1	458	-	400-500	-	Pass
4	2270918-4	4 Aug 2022	Night time	1	412	-	400-500	-	Pass
Area - Workshop/Maintenance Building FL.1 : Pantry									
6.1	2270918-5	4 Aug 2022	Day time	1	1,076	1,077	150	300	Pass
6.2	2270918-6	4 Aug 2022	Day time	2	1,077				
6.1	2270918-7	4 Aug 2022	Night time	1	453	516.0	150	300	Pass
6.2	2270918-8	4 Aug 2022	Night time	2	579				
Area - Workshop/Maintenance Building FL.1 : Women Toilet									
7.1	2270918-9	4 Aug 2022	Day time	1	341	343.0	50	100	Pass
7.2	2270918-10	4 Aug 2022	Day time	2	345				
7.1	2270918-11	4 Aug 2022	Night time	1	244	237.5	50	100	Pass
7.2	2270918-12	4 Aug 2022	Night time	2	231				
Area - Workshop/Maintenance Building FL.1 : Men Toilet									
8.1	2270918-13	4 Aug 2022	Day time	1	256	254.0	50	100	Pass
8.2	2270918-14	4 Aug 2022	Day time	2	252				
8.1	2270918-15	4 Aug 2022	Night time	1	241	240.5	50	100	Pass
8.2	2270918-16	4 Aug 2022	Night time	2	240				

Measurement by : Warakorn Pookrak Personnel of ALS Laboratory Group (Thailand) Co., Ltd.  
Guideline : Notification of Department of Labour Protection and Welfare, B.E.2560 (2017) dated November 27, B.E.2560 (2017), and published in the Royal Government Gazette, Vol.135, Part 390 dated February 21 B.E.2561 (2018)

Technical Management

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Section Head

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Assistant Manager

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## Analysis / Test Report

Client : Gulf JP NS Co., Ltd.  
36 Moo 4, Nong Kob, Nong Saeng, Saraburi Thailand 18170  
P/O : 4600001478  
Project Name : Monitoring EIA  
Project Location : GNS

Lot ID: 2270920  
Date Received : Aug 08, 2022  
Date Reported : Aug 09, 2022  
Report Number : 2398600-1

Page 1 of 1

Lay out No.	Reference Number	Measurement Date	Measurement Time	Spot / Area No.	Illuminance (Lux) Spot	Average	Spot/Min	Guideline Limit	Comment
Spot - Workshop/Maintenance Building FL.2 : IT Office Table									
5	2270920-1	4 Aug 2022	Day time	1	520	-	400-500	-	Pass
5	2270920-2	4 Aug 2022	Night time	1	512	-	400-500	-	Pass
Spot - Workshop/Maintenance Building FL.2 : Electrical Engineer Table									
10	2270920-3	4 Aug 2022	Day time	1	531	-	400-500	-	Pass
10	2270920-4	4 Aug 2022	Night time	1	528	-	400-500	-	Pass
Spot - Workshop/Maintenance Building FL.2 : Instrument Engineer Table 1									
11	2270920-5	4 Aug 2022	Day time	1	514	-	400-500	-	Pass
11	2270920-6	4 Aug 2022	Night time	1	444	-	400-500	-	Pass

Measurement by : Warakorn Pookrak Personnel of ALS Laboratory Group (Thailand) Co., Ltd.

Guideline : Notification of Department of Labour Protection and Welfare, B.E.2560 (2017) dated November 27, B.E.2560 (2017), and published in the Royal Government Gazette, Vol.135, Part 390 dated February 21 B.E.2561 (2018)

Technical Management

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## Analysis / Test Report

Lot ID: 22116307

Client : Gulf JP NS Co., Ltd.  
36 Moo 4, Nong Kob, Nong Saeng, Saraburi Thailand 18170  
Date Received : Nov 07, 2022  
P/O : สัญญาเลขที่600001478  
Date Reported : Nov 08, 2022  
Project Name : Monitoring EIA  
Report Number : 2485837-1  
Project Location : GNS

Page 1 of 1

Lay out No.	Reference Number	Measurement Date	Measurement Time	Spot /Area No.	Illuminance (Lux) Spot	Average	Spot/Min	Guideline Limit	Comment
Area - Electrical and Control Building : Control Package Cooling Tower 29 (Block 2)									
1.1	22116307-1	3 Nov 2022	Day time	1	232	310.5	100	200	Pass
1.2	22116307-2	3 Nov 2022	Day time	2					
1.3	22116307-3	3 Nov 2022	Day time	3					
1.4	22116307-4	3 Nov 2022	Day time	4	274				
Area - Electrical and Control Building : Control Package Cooling Tower 19 (Block 1)									
6.1	22116307-5	3 Nov 2022	Day time	1	212	312.3	100	200	Pass
6.2	22116307-6	3 Nov 2022	Day time	2	415				
6.3	22116307-7	3 Nov 2022	Day time	3	304				
6.4	22116307-8	3 Nov 2022	Day time	4	318				

Measurement by : Arit Srisen Personnel of ALS Laboratory Group (Thailand) Co., Ltd.  
Guideline : Notification of Department of Labour Protection and Welfare, B.E.2560 (2017) dated November 27, B.E.2560 (2017), and published in the Royal Government Gazette, Vol.135, Part 39D dated February 21 B.E.2561 (2018)



## Analysis / Test Report

Lot ID: 22116304

Client : Gulf JP NS Co., Ltd.  
36 Moo 4, Nong Kob, Nong Saeng, Saraburi Thailand 18170  
Date Received : Nov 07, 2022  
P/O : สัญญาเลขที่600001478  
Date Reported : Nov 08, 2022  
Project Name : Monitoring EIA  
Report Number : 2485831-1  
Project Location : GNS

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Lay out No.	Reference Number	Measurement Date	Measurement Time	Spot /Area No.	Illuminance (Lux) Spot	Average	Spot/Min	Guideline Limit	Comment
Spot - Administration Building : EH&S Manager									
2	22116304-1	3 Nov 2022	Day time	1	417	-	400-500	-	Pass
Spot - Administration Building : EH&S Office									
3	22116304-2	3 Nov 2022	Day time	1	685	-	400-500	-	Pass
Spot - Administration Building : CR Room Helper									
6	22116304-3	3 Nov 2022	Day time	1	690	-	400-500	-	Pass
Area - Administration Building : Pantry									
12.1	22116304-4	3 Nov 2022	Day time	1	746	850.0	150	300	Pass
12.2	22116304-5	3 Nov 2022	Day time	2	954				
Spot - Administration Building : Purchase Table 1									
18	22116304-6	3 Nov 2022	Day time	1	577	-	400-500	-	Pass
Area - Administration Building : โรงเก็บ (โรงเก็บน้ำมันประปา-เจ้าหน้าที่)									
19.1	22116304-7	3 Nov 2022	Day time	1	165	183.0	50	100	Pass
19.2	22116304-8	3 Nov 2022	Day time	2	214				
19.3	22116304-9	3 Nov 2022	Day time	3	162				
19.4	22116304-10	3 Nov 2022	Day time	4	191				
Area - Administration Building : โรงประปา 1 (โรงประปาแม่สุพรรณ)									
20.1	22116304-11	3 Nov 2022	Day time	1	983	667.2	150	300	Pass
20.2	22116304-12	3 Nov 2022	Day time	2	446				
20.3	22116304-13	3 Nov 2022	Day time	3	516				
20.4	22116304-14	3 Nov 2022	Day time	4	411				
20.5	22116304-15	3 Nov 2022	Day time	5	994				
20.6	22116304-16	3 Nov 2022	Day time	6	653				

Measurement by : Arit Srisen Personnel of ALS Laboratory Group (Thailand) Co., Ltd.  
Guideline : Notification of Department of Labour Protection and Welfare, B.E.2560 (2017) dated November 27, B.E.2560 (2017), and published in the Royal Government Gazette, Vol.135, Part 39D dated February 21 B.E.2561 (2018)

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Assistant Manager

Approved by

Wichan Choonharat  
Assistant Manager

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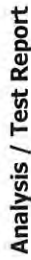
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Lot ID: 22116308

Date Received : Nov 07, 2022  
Date Reported : Nov 08, 2022  
Report Number : 2485840-1

Report Number : 2485840-1

Page 1 of 1

**Measurement by:** Arthi Sisen Personnel of ALS Laboratory Group (Thailand) Co., Ltd.  
**Guideline:** Notification of Department of Labour Protection and Welfare, B.E.2560 (2017) dated November 27, B.E.2560 (2017), and published in the Royal Government Gazette, Vol.135, Part 39d dated February 21 B.E.2561 (2018)

**Measurement by:** Arthi Sisen Personnel of ALS Laboratory Group (Thailand) Co., Ltd.  
**Guideline:** Notification of Department of Labour Protection and Welfare, B.E.2560 (2017) dated November 27, B.E.2560 (2017), and published in the Royal Government Gazette, Vol.135, Part 39d dated February 21 B.E.2561 (2018)

**Supot Salamteh**  
Section Head

**Approved by**

**Wichan Choonharat**  
Assistant Manager

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Client: Gulf ID Inc Co Ltd

Client : GULF JAPAN CO., LTD.  
36 Moo 4, Nong Kob, Nong Saeng, Saraburi Thailand 18170

Project Name	: Monitoring EIA
--------------	------------------

Project Location : GNS

Page 1 of 1

	Day time	1	593	-	400-500	-	Pass
13	22116309-14	3 Nov 2022					

**Measurement by:** Arit Srisen Personnel of ALS Laboratory Group (Thailand) Co., Ltd.

**Guideline:** Notification of Department of Labour Protection and Welfare, B.E.2560 (2017) dated November 27, B.E.2560 (2017), and published in the Royal Government Gazette, Vol.135, Part. 39D dated February 21 B.E.2561 (2018)

	Day time	1	593	-	400-500	-	Pass
13	22116309-14	3 Nov 2022					

**Measurement by:** Arit Srisen Personnel of ALS Laboratory Group (Thailand) Co., Ltd.

**Guideline:** Notification of Department of Labor Protection and Welfare, B.E.2560 (2017) dated November 27, B.E.2560 (2017), and published in the Royal Government Gazette, Vol.135, Part. 39D dated February 21 B.E.2561 (2018)

Supot Salamteh  
Section Head

**Approved by**

**Wichan Choonharat**  
Assistant Manager

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ภาคผนวก ง

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เอกสารการสอบเทียบเครื่องมือตรวจวิเคราะห์





CONSOLE CONTROL UNIT CALIBRATION TEST REPORT

Calibration Date : 3 Jul 22  
Next Cal. Date : 3 Jan 23  
Barometric Pressure (mmHg) : 753  
Relative Humidity (%) : 55.0  
Temperature : 34.0  
Reference Dry Gas Meter ID : BKK\_FS0629  
Dry Gas Meter No. : 1607039  
Serial No. : 142087  
Model No. : XC-572-V  
Next Calibration Date : 7 Oct 22

AIH	gpm (l/s)	Meters	Reference Dry Gas Meter Calibration										Console Control Dry Gas Meter										Office Calibration	
			Flow	Temp	Pressure	Temp	Pressure	Temp	Pressure	Temp	Pressure	Temp	Flow	Temp	Pressure	Temp	Pressure	Temp	Pressure	Temp	Pressure	Temp	Factor	Factor
1	1.138	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
2	2.276	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00
3	3.414	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00
4	4.552	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00
5	5.690	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00
6	6.828	600.00	600.00	600.00	600.00	600.00	600.00	600.00	600.00	600.00	600.00	600.00	600.00	600.00	600.00	600.00	600.00	600.00	600.00	600.00	600.00	600.00	600.00	600.00
7	7.966	700.00	700.00	700.00	700.00	700.00	700.00	700.00	700.00	700.00	700.00	700.00	700.00	700.00	700.00	700.00	700.00	700.00	700.00	700.00	700.00	700.00	700.00	700.00
8	9.104	800.00	800.00	800.00	800.00	800.00	800.00	800.00	800.00	800.00	800.00	800.00	800.00	800.00	800.00	800.00	800.00	800.00	800.00	800.00	800.00	800.00	800.00	800.00
9	10.242	900.00	900.00	900.00	900.00	900.00	900.00	900.00	900.00	900.00	900.00	900.00	900.00	900.00	900.00	900.00	900.00	900.00	900.00	900.00	900.00	900.00	900.00	900.00
10	11.380	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00

Y : Ratio of reading of reference to dry gas meter, tolerance for individual values  $\pm 0.02$  from average.

$\Delta P$  : Office pressure differential, the value is  $\pm 0.124$  in at 25°C and 30 mm of mercury,  $\pm 0.002$  tolerance for individual values  $\pm 0.02$  from average.

Procedure: 4C98/GAPP/AMEN/SEC13.8.7

Calibrated by : (Mr. Praset Surakhin)

Approved by : (Mr. Samart Roongan)

Field Scientist (3)

Specialist (1)



Pitot Tube Calibration Data

Pitot Tube Identification Number : BKK\_FS0501  
Lab test duct Number : 258-1-13-01  
Calibration Sheet No. : C-030722-BKK\_FS0501

Calibration Date : 3 Jul 22  
Standard Pitot ID : BKK\_FS0441  
Cp Standard : 0.99

Test	Type s pitot tube Leg A,B	Standard pitot tube ( $\Delta P$ , mm.H <sub>2</sub> O)	Type s pitot tube Leg A,B	Cp (s)	Cp (s)
Test 1	A	12.00	16.60	0.842	-
	B	12.00	16.60	-	0.842
Test 2	A	12.00	16.60	0.842	-
	B	12.00	16.60	-	0.842
Test 3	A	12.00	16.60	0.842	-
	B	12.00	16.60	-	0.842
				$\bar{C}_p$	0.842

$$Cp_{(P)} = Cp_{(R)} \sqrt{\frac{\Delta P_{(P)}}{\Delta P_{(R)}}}$$
$$|Cp_{(A)} - Cp_{(B)}| \text{ must BE } \leq 0.01$$
$$\text{Average deviation (A or B)} = \frac{\sum |Cp_{(A)} - Cp_{(B)}|}{3} \text{ must BE } \leq 0.01$$

Calibrated by : (Mr. Praset Surakhin)

Approved by : (Mr. Samart Roongan)

Field Scientist (3)

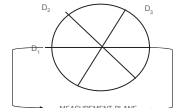
Field Specialist (1)



PROBE NOZZLE DIAMETER CALIBRATION DATA SHEET

Nozzle ID #	Nozzle Diameter (mm)			H <sub>0</sub> / L <sub>0</sub>	D <sub>0</sub> = (D <sub>1</sub> + D <sub>2</sub> ) / 2
	D <sub>1</sub>	D <sub>2</sub>	D <sub>0</sub>		
1	0.315	0.315	0.315	0.000	0.315
2	0.475	0.475	0.475	0.000	0.475
3	0.635	0.635	0.635	0.000	0.635
4	0.790	0.790	0.790	0.000	0.790
5	0.950	0.950	0.950	0.000	0.950
6	1.110	1.110	1.110	0.000	1.110
7	1.270	1.270	1.270	0.000	1.270

Where :  
D<sub>1</sub>, D<sub>2</sub>, D<sub>0</sub> : = Three different nozzle diameters at 90 degrees to each other, each measured the nearest 0.025 mm.  
ΔD : = Maximum distance between any two diameters, must be  $\leq 0.100$  mm.  
D<sub>avg</sub> : = (D<sub>1</sub> + D<sub>2</sub>) / 2



Calibrated by : (Mr. Praset Surakhin)

Approved by : (Mr. Samart Roongan)

Field Scientist (3)

Field Specialist (1)



CONSOLE CONTROL UNIT CALIBRATION TEST REPORT

Calibration Date : 12 Jul 22  
Next Cal. Date : 12 Jan 23  
Barometric Pressure (mmHg) : 754  
Relative Humidity (%) : 62.0  
Temperature : 31.0  
Reference Dry Gas Meter ID : BKK\_FS0629  
Dry Gas Meter No. : 1607039  
Serial No. : 142087  
Model No. : XC-572-V  
Next Calibration Date : 25 Nov 23

AIH	gpm (l/s)	Meters	Reference Dry Gas Meter Calibration										Console Control Dry Gas Meter										Office Calibration	
			Flow	Temp	Pressure	Temp	Pressure	Temp	Pressure	Temp	Pressure	Temp	Flow	Temp	Pressure	Temp	Pressure	Temp	Pressure	Temp	Pressure	Temp	Factor	Factor
1	1.138	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
2	2.276	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00
3	3.414	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00
4	4.552	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00
5	5.690	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00
6	6.828	600.00	600.00	600.00	600.00	600.00	600.00	600.00	600.00	600.00	600.00	600.00	600.00	600.00	600.00	600.00	600.00	600.00	600.00	600.00	600.00	600.00	600.00	600.00
7	7.966	700.00	700.00	700.00	700.00	700.00	700.00	700.00	700.00	700.00	700.00	700.00	700.00	700.00	700.00	700.00	700.00	700.00	700.00	700.00	700.00	700.00	700.00	700.00
8	9.104	800.00	800.00	800.00	800.00	800.00	800.00	800.00	800.00	800.00	800.00	800.00	800.00	800.00	800.00	800.00	800.00	800.00	800.00	800.00	800.00	800.00	800.00	800.00
9	10.242	900.00	900.00	900.00	900.00	900.00	900.00	900.00	900.00	900.00	900.00	900.00	900.00	900.00	900.00	900.00	900.00	900.00	900.00	900.00	900.00	900.00	900.00	900.00
10	11.380	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00

Y : Ratio of reading of reference to dry gas meter, tolerance for individual values  $\pm 0.02$  from average.

$\Delta P$  : Office pressure differential, the value is  $\pm 0.124$  in at 25°C and 30 mm of mercury,  $\pm 0.002$  tolerance for individual values  $\pm 0.02$  from average.

Procedure: 4C98/GAPP/AMEN/SEC13.8.7

Calibrated by : (Mr. Praset Surakhin)

Approved by : (Mr. Samart Roongan)

Field Scientist (3)

Specialist (1)



Stopwatch Calibration Test Report

Calibration Date : 3 Jul 22  
Barometric Pressure (mmHg) : 756  
Relative Humidity (%) : 62.0

Next Cal. Date : 3 Jan 23  
Temperature (°C) : 31.0

Reference Stopwatch Data  
Stopwatch ID No. : E18061  
Model : F806  
Serial No. : -  
Calibration Date : 8 Sep 20  
Certificate No. : E-2009018

Console Control Meter Data  
Dry Gas Meter No. : BKK\_FS0547  
Model : XC-572-V  
Serial No. : 1606040

Run No.	Time Actual (m:ss.ms)	Time Reading (m:ss)	Diff. (ms)	Diff. (min)
1	5:00:10	5:00	10	0.00017
2	5:00:11	5:00	11	0.00018
3	5:00:12	5:00	12	0.00020
4	5:00:11	5:00	11	0.00018
5	5:00:10	5:00	10	0.00017
6	5:00:10	5:00	10	0.00017
7	5:00:10	5:00	10	0.00017
8	5:00:14	5:00	14	0.00023
9	5:00:14	5:00	14	0.00018
10	5:00:14	5:00	14	0.00018
			Average	0.00020
			SD	0.00002

Calibrate by : (Mr. Praset Surakhin)

Approved by : (Mr. Samart Roongan)

Field Scientist (3)

Specialist (1)



DIGITAL TEMPERATURE CALIBRATION DATA SHEET

Calibration Date : 3 Jul 22		Ambient Temperature (°C) : 31		
Calibration sheet No. : C-030722-BKK_FS0548		Relative Humidity (%) : 62		
Digital Temperature ID : BKK_FS0548		Reference Temperature ID : BKK_FS1144		
Console Serial No. : 1606040		Serial No. : 201800000013		
Console Model : XC-572-V		Model : DigiConn-CC-VT-485		
		Next Calibrate : 31 Jan 23		
Location	Reference Temperature °C	Digital Temperature °C	Error °C	Remark
Stack	0	1	1	
	25	26	1	
	50	52	2	
	100	102	2	
	150	152	2	
	200	202	2	
Probe	250	252	2	
	300	302	2	
	500	502	2	
	1000	1002	2	
	1200	1202	2	
	125	126	1	
Oven	100	101	1	
	125	126	1	
	150	151	1	
	150	151	1	
Filter	100	101	1	
	125	126	1	
	150	151	1	
	150	151	1	
Exit	0	1	1	
	10	11	1	
	20	21	1	
	0	2	2	
Meter	25	27	2	
	50	52	2	
	0	2	2	
	25	27	2	
AUX	50	52	2	
	0	2	2	
	25	27	2	
	50	52	2	

Calibrated by : (Mr. Praset Surakhin)



### Pitot Tube Calibration Data

Pitot Tube Identification Number : BKK-FS0551 Calibration Date : 3 Jul 22  
Lab test duct Number : 256-1-13-01 Standard Pitot ID : BKK-FS0441  
Calibration Sheet No. : C-030722-BKK-FS0551 Cp Standard : 0.99

Type S Pitot Tube Coefficient Data					
	Type s pitot tube Leg A,B	Standard pitot tube ( $\Delta P$ , mm.H <sub>2</sub> O)	Type s pitot tube ( $\Delta P$ , mm.H <sub>2</sub> O)	Cp (s) Leg A	Cp (s) Leg B
Test 1	A	12.00	16.60	0.842	-
	B	12.00	16.60	-	0.842
Test 2	A	12.00	16.60	0.842	-
	B	12.00	16.60	-	0.842
Test 3	A	12.00	16.60	0.842	-
	B	12.00	16.60	-	0.842
		$C_p$	0.842	0.842	

$$CpSp = Cp - \sqrt{\frac{\Delta P_{(sB)}}{\Delta P_{(s)}}}$$
$$|Cp_{(A)} - Cp_{(B)}|_{\text{must BE} \leq 0.01}$$
$$\sum [Cp_{(s)} - Cp_{(A \text{ or } B)}]_{\text{must BE} \leq 0.01}$$

Calibrated by Mr. Pisant Surathan Approved by Mr. Smart Ron-ngen  
Field Scientist (3) Specialist (1)



### Pitot Tube Calibration Data

Pitot Tube Identification Number : BKK-FS0552 Calibration Date : 3 Jul 22  
Lab test duct Number : 256-1-13-01 Standard Pitot ID : BKK-FS0441  
Calibration Sheet No. : C-030722-BKK-FS0552 Cp Standard : 0.99

Type S Pitot Tube Coefficient Data					
	Type s pitot tube Leg A,B	Standard pitot tube ( $\Delta P$ , mm.H <sub>2</sub> O)	Type s pitot tube ( $\Delta P$ , mm.H <sub>2</sub> O)	Cp (s) Leg A	Cp (s) Leg B
Test 1	A	12.00	16.60	0.842	-
	B	12.00	16.60	-	0.842
Test 2	A	12.00	16.60	0.842	-
	B	12.00	16.60	-	0.842
Test 3	A	12.00	16.60	0.842	-
	B	12.00	16.60	-	0.842
		$C_p$	0.842	0.842	

$$CpSp = Cp - \sqrt{\frac{\Delta P_{(sB)}}{\Delta P_{(s)}}}$$
$$|Cp_{(A)} - Cp_{(B)}|_{\text{must BE} \leq 0.01}$$
$$\sum [Cp_{(s)} - Cp_{(A \text{ or } B)}]_{\text{must BE} \leq 0.01}$$

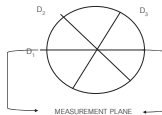
Calibrated by Mr. Pisant Surathan Approved by Mr. Smart Ron-ngen  
Field Scientist (3) Specialist (1)



### PROBE NOZZLE DIAMETER CALIBRATION DATA SHEET

Calibration Date : 3 Jul 22		Nozzle Set ID : BKK-FS0553			
Calibration Sheet No. : C-030722-BKK-FS0553		Vernier Caliper ID : BKK-FS0526			
Nozzle ID #	Nozzle Diameter (cm.)			$\Delta D$	$D_1 = D_2 = D_3 \pm$
	$D_1$	$D_2$	$D_3$		
1	0.310	0.310	0.310	0.000	0.310
2	0.450	0.450	0.450	0.000	0.450
3	0.635	0.635	0.635	0.000	0.635
4	0.790	0.790	0.790	0.000	0.790
5	0.950	0.950	0.950	0.000	0.950
6	1.110	1.110	1.110	0.000	1.110
7	1.270	1.270	1.270	0.000	1.270

Where :  
D<sub>1</sub>, D<sub>2</sub>, D<sub>3</sub> = Three different nozzle diameters at 60 degrees to each other, each measured the nearest 0.025 mm.  
 $\Delta D$  = Maximum distance between any two diameters, must be  $\leq 0.100$  mm.  
 $D_{avg}$  =  $(D_1 + D_2 + D_3) / 3$



Calibrated by Mr. Pisant Surathan Approved by Mr. Smart Ron-ngen  
Field Scientist (3) Specialist (1)



PENTA CALIBRATION CO., LTD.  
88/124 The Connect 20 Village Kanchanaphak Road  
Sukhumvit Road Bangkok 10250  
Tel : +66 (0) 2586-9713  
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### Certificate of Calibration

Represent to Certificate of Calibration : PTC07/22071

Certificate No. : PTC07/22071 Page : 1 of 2  
Equipment : Digital Balance Condition : Normal  
Manufacturer : Sartorius Serial No. : 26201042  
Model : MS2204-100-DU ID No. : BKK-EN0502  
Type of Balance : Single Interval

Customer : ALS Laboratory Group (Thailand) Co., Ltd.  
104 Phraethanank 40 Phraethanank Rd.,  
Khweng Phraethanank, Khul Saen Luang, Bangkok 10250.

Environment Condition : Temperature : 21.5 °C ± 0.7 °C  
Humidity : 61.5 %RH ± 4.7 %RH  
Air density : 1.19 kg/m<sup>3</sup>

Calibration Place : ALS Laboratory Group (Thailand) Co., Ltd.  
104 Phraethanank 40 Phraethanank Rd.,  
Khweng Phraethanank, Khul Saen Luang, Bangkok 10250.

The Method used : In house method, PTC04-07, base on EN893-1  
Traceability : This certificate is traceable to the SI Units through The Calibration Service Co., Ltd.  
ISO-9001 Accreditation No. : Calibration 0189  
Date Received : February 25, 2022  
Calibration Date : February 25, 2022  
Issued Date : March 01, 2022  
Calibration By : Mr. Rungrat Meesil



REVIEW BY Smart P  
APPROVED BY KL AL  
NEXT CAL DATE 25/02/23



Approved By : Mr. Kaitum Kerdin  
Reviewed By : Mr. Kaitum Kerdin  
This certificate is based on the value of measurement according to the International System of Units (SI). It provides traceability of measurement to international or national standard or other recognized national standard.  
The measurement uncertainty stated is the expanded uncertainty which is obtained from the electronic uncertainty multiplied by the coverage factor (k=2) to provide a level of confidence of approximately 95%. It is recommended to accompany with this Guide to Evaluation of Uncertainty in Measurement (GUM). This effect has been taken into account by the given calibration.  
This calibration certificate does not have reproduction without a full copy, without written approval from Penta Calibration Co., Ltd.



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Represent to Certificate of Calibration : PTC07/22071

Certificate No. : PTC07/22071 Page : 2 of 2

Measurement Results : Without Adjustment : Non Adjustment

Function Calibration : Non Adjustment

Electronic Error: Weight to be 1/3, 1/2 or of Maximum capacity

Eccentricity test 100 (g)					
Position (g)					
	1	2	3	4	5
0.0000	-0.0002	-0.0001	0.0001	-0.0001	0.0002
Maximum deviation : 0.0002					

Repeatability Test : Weight to be 10 ≤ L<sub>1</sub> ≤ Maximum capacity  
Determination of the standard deviation of weighing balance : Repeatability : 0.0001 (g)

Nominal test value (g)	Standard Deviation
200	0.00005

Error of Indication : from nominal values, Repeatability : 0.0001 (g)					
Nominal Value (g)	Conventional Mass	Indication	Correction of Balance	Uncertainty	k
0	0.00000	0.00000	0.00000	0.00016	2.52
0.1	0.10000	0.10000	0.00000	0.00016	2.52
0.5	0.50000	0.50000	0.00000	0.00016	2.52
1	1.00001	1.00001	0.00000	0.00016	2.52
2	2.00001	2.00001	0.00000	0.00016	2.52
5	5.00001	5.00001	0.00000	0.00016	2.52
10	10.00002	10.00000	0.00000	0.00016	2.52
20	20.00002	20.00000	0.00000	0.00016	2.52
50	50.00001	50.00000	0.00000	0.00017	2.52
100	100.00002	100.00000	0.00000	0.00020	2.52
120	120.00004	120.00000	0.00000	0.00023	2.52
150	150.00003	150.00000	0.00000	0.00026	2.52
200	200.00003	200.00000	0.00000	0.00030	2.52

Note: Weight of adjust : (g)

The End of Certificate



### ANALYZER CALIBRATION DATA

Client : Out JP HS Co., Ltd. Location : HR99 11  
Date : 28 Jul 22 Test Operator : April B

O<sub>2</sub> ANALYZER Model : HORIBA PO-300 Serial No. : V000V008

Cylinder Value (%)	Initial Analyzers Calibration Response (%)	Final Analyzers Calibration Response (%)	Difference (Percent of Span)
Zero Gas	0.00	0.00	0.00
Low-Level Gas	8.00	8.10	0.08
Span Gas	16.00	16.11	0.24

H<sub>2</sub>O ANALYZER Model : HORIBA PO-300 Serial No. : V000V008

Cylinder Value (ppm)	Initial Analyzers Calibration Response (ppm)	Final Analyzers Calibration Response (ppm)	Difference (Percent of Span)
Zero Gas	0.00	0.00	0.00
Low-Level Gas	50.32	51.10	0.04
Span Gas	405.19	406.10	0.06

SO<sub>2</sub> ANALYZER Model : HORIBA PO-300 Serial No. : V000V008

Cylinder Value (ppm)	Initial Analyzers Calibration Response (ppm)	Final Analyzers Calibration Response (ppm)	Difference (Percent of Span)
Zero Gas	0.00	0.00	0.00
Low-Level Gas	50.27	49.80	0.18
Span Gas	396.50	395.40	0.16

CO ANALYZER Model : HORIBA PO-300 Serial No. : V000V008

Cylinder Value (ppm)	Initial Analyzers Calibration Response (ppm)	Final Analyzers Calibration Response (ppm)	Difference (Percent of Span)
Zero Gas	0.00	0.00	0.00
Low-Level Gas	49.50	50.80	0.08
Span Gas	396.10	397.60	0.08

Calibrated by Mr. April Bng-he  
Environmental Field Scientist (4)

FORM NO. F-06-02 REVISION NO. 2 ISSUE DATE: 2007/10  
ALS Laboratory Group



### SYSTEM CALIBRATION BIAS AND DRIFT DATA

Lot No. : 2270883-1

Client : Out JP HS Co., Ltd. Location : HR99 11  
Date : 28 Jul 22 Test Operator : April B

O<sub>2</sub> ANALYZER Model : HORIBA PO-300 Serial No. : V000V008  
CO<sub>2</sub> ANALYZER Model : HORIBA PO-300 Serial No. : V000V008

Cylinder Value (%)	Initial Value	System Calibration Response	System Cal Bias (% of Span)	System Calibration Response	System Cal Bias (% of Span)	Drift (% of Span)
Zero Gas	0.00	0.00	0.00	0.00	0.00	0.00
Span Gas	16.11	16.11	0.00	16.13	0.08	0.08

H<sub>2</sub>O ANALYZER Model : HORIBA PO-300 Serial No. : V000V008

Cylinder Value (ppm)	Initial Value	System Calibration Response	System Cal Bias (% of Span)	System Calibration Response	System Cal Bias (% of Span)	Drift (% of Span)
Zero Gas	0.00	0.00	0.00	0.00	0.00	0.00
Span Gas	405.19	405.70	0.08	406.10	0.08	0.08

CO ANALYZER Model : HORIBA PO-300 Serial No. : V000V008

Cylinder Value (ppm)	Initial Value	System Calibration Response	System Cal Bias (% of Span)	System Calibration Response	System Cal Bias (% of Span)	Drift (% of Span)
Zero Gas	0.00	0.00	0.00	0.00	0.00	0.00
Span Gas	396.50	396.50	0.04	396.50	0.04	0.04

CO ANALYZER Model : HORIBA PO-300 Serial No. : V000V008

Cylinder Value (ppm)	Initial Value	System Calibration Response	System Cal Bias (% of Span)	System Calibration Response	System Cal Bias (% of Span)	Drift (% of Span)
Zero Gas	0.00	1.00	0.20	1.40	0.28	0.08
Span Gas	397.50	398.50	0.30	398.50	0.10	0.40

Calibrated by Mr. April Bng-he  
Environmental Field Scientist (4)

FORM NO. F-06-02 REVISION NO. 2 ISSUE DATE: 2007/10  
ALS Laboratory Group



### EMISSION TEST RESULT

Client : Out JP HS Co., Ltd. Location : HR99 11  
Date : 28 Jul 22 Test Operator : April B

O<sub>2</sub> ANALYZER Model : HORIBA PO-300 Serial No. : V000V008  
CO<sub>2</sub> ANALYZER Model : HORIBA PO-300 Serial No. : V000V008

Time (min)	O <sub>2</sub> (%)	CO <sub>2</sub> (%)	HCN (ppm)	CO (ppm)	CO (ppm)	Remark
11:07	14.82	4.43	8.45	1.50	127.35	
11:09	14.81	4.43	8.45	1.50	127.35	
11:10	14.82	4.41	8.42	1.45	127.35	
11:11	14.82	4.38	8.43	1.37	127.40	
11:12	14.82	4.43	8.45	1.42	127.35	
11:13	14.82	4.38	8.48	1.37	127.25	
11:14	14.82	4.43	8.45	1.42	127.35	
11:15	14.82	4.44	8.32	1.43	126.77	
11:16	14.82	4.44	8.30	1.43	126.60	
11:17	14.81	4.41	8.35	1.40	127.25	
11:18	14.81	4.43	8.33	1.42	127.35	
11:19	14.81	4.43	8.47	1.52	124.55	
11:20	14.84	4.42	7.73	1.39	126.45	
11:21	14.84	4.42	7.76	1.39	126.12	
11:22	14.83	4.44	7.71	1.42	126.13	
11:23	14.82	4.38	7.84	1.37	125.55	
11:24	14.82	4.44	7.80	1.35	125.15	
11:25	14.82	4.40	7.69	1.39	124.36	
11:26	14.83	4.41	7.80	1.40	124.00	
11:27	14.83	4.38	7.88	1.37	124.07	
Average	14.81	4.41	8.18	1.40	126.25	

Calibrated by Mr. April Bng-he  
Environmental Field Scientist (4)

FORM NO. F-06-02 REVISION NO. 2 ISSUE DATE: 2007/10  
ALS Laboratory Group



### EMISSION TEST RESULT

Client : Out JP HS Co., Ltd. Location : HR99 11  
Date : 28 Jul 22 Test Operator : April B

O<sub>2</sub> ANALYZER Model : HORIBA PO-300 Serial No. : V000V008  
CO<sub>2</sub> ANALYZER Model : HORIBA PO-300 Serial No. : V000V008

COCO Analyzer Model	NORMA P0-850			Burst No.	W0000000	
Time (min)	O <sub>2</sub> (%)	CO <sub>2</sub> (%)	HCN (ppm)	CO (ppm)	CO (ppm)	Remark
11:02	14.83	4.43	7.89	1.39	125.35	
11:03	14.85	4.45	8.01	1.40	122.35	
11:04	14.86	4.38	7.83	1.37	124.21	
11:05	14.85	4.40	7.89	1.39	121.52	
11:06	14.84	4.39	8.07	1.36	123.72	
11:07	14.84	4.40	8.09	1.39	123.21	
11:08	14.84	4.41	8.20	1.38	123.12	
11:09	14.84	4.39	8.09	1.38	123.31	
11:10	14.83	4.41	8.07	1.40	122.18	
11:11	14.83	4.42	8.19	1.41	120.38	
11:12	14.84	4.43	8.39	1.43	119.87	
11:13	14.83	4.42	8.27	1.41	119.47	
11:14	14.83	4.42	8.17	1.41	124.10	
11:15	14.83	4.45	8.42	1.41	124.75	
11:16	14.83	4.47	8.28	1.40	120.87	
11:17	14.83	4.47	8.29	1.41	120.87	
11:18	14.83	4.45	8.17	1.41	124.10	
11:19	14.70	4.51	7.42	1.41	241.75	
11:20	14.71	4.49	7.73	1.40	242.38	
11:21	14.61	4.50	7.72	1.41	181.58	
11:22	14.56	4.50	7.62	1.41	124.38	
11:23	14.05	4.57	6.17	1.61	207.73	
11:24	14.05	4.57	6.26	1.61	207.73	
11:25	14.05	4.57	6.17	1.61	207.73	
11:26	14.05	4.57	6.17	1.61	207.73	
11:27	14.05	4.57	6.17	1.61	207.73	
11:28	14.05	4.57	6.17	1.61	207.73	
11:29	14.05	4.57	6.17	1.61	207.73	
11:30	14.05	4.57	6.17	1.61	207.73	
11:31	14.05	4.57	6.17	1.61	207.73	
11:32	14.05	4.57	6.17	1.61	207.73	
11:33	14.05	4.57	6.17	1.61	207.73	
11:34	14.05	4.57	6.17	1.61	207.73	
11:35	14.05	4.57	6.17	1.61	207.73	
11:36	14.05	4.57	6.17	1.61	207.73	
11:37	14.05	4.57	6.17	1.61	207.73	
11:38	14.05	4.57	6.17	1.61	207.73	
11:39	14.05	4.57	6.17	1.61	207.73	
11:40	14.05	4.57	6.17	1.61	207.73	
11:41	14.05	4.57	6.17	1.61	207.73	
11:42	14.05	4.57	6.17	1.61	207.73	
11:43	14.05	4.57	6.17	1.61	207.73	
11:44	14.05	4.57	6.17	1.61	207.73	
11:45	14.05	4.57	6.17	1.61	207.73	
11:46	14.05	4.57	6.17	1.61	207.73	
11:47	14.05	4.57	6.17	1.61	207.73	
11:48	14.05	4.57	6.17	1.61	207.73	
11:49	14.05	4.57	6.17	1.61	207.73	
11:50	14.05	4.57	6.17	1.61	207.73	
11:51	14.05	4.57	6.17	1.61	207.73	
11:52	14.05	4.57	6.17	1.61	207.73	
11:53	14.05	4.57	6.17	1.61	207.73	
11:54	14.05	4.57	6.17	1.61	207.73	
11:55	14.05	4.57	6.17	1.61	207.73	
11:56	14.05	4.57	6.17	1.61	207.73	
11:57	14.05	4.57	6.17	1.61	207.73	
11:58	14.05	4.57	6.17	1.61	207.73	
11:59	14.05	4.57	6.17	1.61	207.73	
12:00	14.05	4.57	6.17	1.61	207.73	



( Mr. Apilall Singha )

**Environmental Field Scientist (4)**ANALYZER CALIBRATION DATA

Lot No. 2270884-1

Calibrated by

( Mr. Apsall Singha )

FORM NO.: F-05-002 REVISION NO.: 2 ISSUE DATE: 3/06/11  
ALS Laboratory Group

ALS Laboratory Group



(Mr. Ajit Singh)

Environmental Field Scientist (C)

### EMISSION TEST RESULT

(Mr. Ajit Singh)

Environmental Field Scientist (4

FORM NO.: F-06-002 REVISION NO.: 2 ISSUE DATE: 3/06/1

ALS Laboratory Group



( Mr. Apoll Singh )

Environmental Field Scientist (4)

FORM NO. E-66-003, REVISION NO. 3, ISSUE DATE: 3/6/85

H. E. J. Lohman et al.



Calibrated by  
Nancybat S.

( Mr.Navaphut Brivriya )  
Environmental Field Scientist (2)

SYSTEM CALIBRATION BIAS AND DRIFT DATA

Lot No. 2270889

Calibrated by  
Nanyath S.

Environmental Field Scientist (2)



(Mr. Neuphat Briviyu)

Fundamental Field Subfield (FS)

FORM NO.: F-06-042 REVISION NO.: 2 ISSUE DATE: 2006/19



## EMISSION TEST RESULT

Client	Guif JP NB Co., Ltd.	Run #	2
Date	07 Oct 22	Location	HONG 21
Start Time	11:08	Test Operator	Nangphat S.
CO <sub>2</sub> Analyzer Model	TELEDYNE API 100BH	Flash Time	12-12
NO <sub>x</sub> /CO <sub>2</sub> Analyzer Model	TELEDYNE API 200BH	Serial No.	282
CO/CO <sub>2</sub> Analyzer Model	TELEDYNE API 300BH	Serial No.	300

Time (s)	CO <sub>2</sub> (%)	CO <sub>2</sub> (%)	NO <sub>x</sub> (ppm)	NO <sub>x</sub> (ppm)	CO (ppm)	CO (ppm)	Remark
11:08	14.08	4.74	14.08	0.07	0.06		
11:09	14.09	4.71	14.09	0.06	0.06		
11:10	14.09	4.72	14.09	0.06	0.06		
11:11	14.09	4.72	14.09	0.06	0.06		
11:12	14.09	4.72	14.09	0.06	0.06		
11:13	14.09	4.72	14.09	0.06	0.06		
11:14	14.09	4.72	14.09	0.06	0.06		
11:15	14.09	4.72	14.09	0.06	0.06		
11:16	14.09	4.72	14.09	0.06	0.06		
11:17	14.09	4.72	14.09	0.06	0.06		
11:18	14.09	4.72	14.09	0.06	0.06		
11:19	14.09	4.72	14.09	0.06	0.06		
11:20	14.09	4.72	14.09	0.06	0.06		
11:21	14.09	4.72	14.09	0.06	0.06		
11:22	14.09	4.72	14.09	0.06	0.06		
11:23	14.09	4.72	14.09	0.06	0.06		
11:24	14.09	4.72	14.09	0.06	0.06		
11:25	14.09	4.72	14.09	0.06	0.06		
11:26	14.09	4.72	14.09	0.06	0.06		
11:27	14.09	4.72	14.09	0.06	0.06		
11:28	14.09	4.72	14.09	0.06	0.06		
11:29	14.09	4.72	14.09	0.06	0.06		
11:30	14.09	4.72	14.09	0.06	0.06		
11:31	14.09	4.72	14.09	0.06	0.06		
11:32	14.09	4.72	14.09	0.06	0.06		
11:33	14.09	4.72	14.09	0.06	0.06		
11:34	14.09	4.72	14.09	0.06	0.06		
11:35	14.09	4.72	14.09	0.06	0.06		
11:36	14.09	4.72	14.09	0.06	0.06		
11:37	14.09	4.72	14.09	0.06	0.06		
11:38	14.09	4.72	14.09	0.06	0.06		
11:39	14.09	4.72	14.09	0.06	0.06		
11:40	14.09	4.72	14.09	0.06	0.06		
11:41	14.09	4.72	14.09	0.06	0.06		
11:42	14.09	4.72	14.09	0.06	0.06		
11:43	14.09	4.72	14.09	0.06	0.06		
11:44	14.09	4.72	14.09	0.06	0.06		
11:45	14.09	4.72	14.09	0.06	0.06		
11:46	14.09	4.72	14.09	0.06	0.06		
11:47	14.09	4.72	14.09	0.06	0.06		
11:48	14.09	4.72	14.09	0.06	0.06		
11:49	14.09	4.72	14.09	0.06	0.06		
11:50	14.09	4.72	14.09	0.06	0.06		
11:51	14.09	4.72	14.09	0.06	0.06		
11:52	14.09	4.72	14.09	0.06	0.06		
11:53	14.09	4.72	14.09	0.06	0.06		
11:54	14.09	4.72	14.09	0.06	0.06		
11:55	14.09	4.72	14.09	0.06	0.06		
11:56	14.09	4.72	14.09	0.06	0.06		
11:57	14.09	4.72	14.09	0.06	0.06		
11:58	14.09	4.72	14.09	0.06	0.06		
11:59	14.09	4.72	14.09	0.06	0.06		
12:00	14.09	4.72	14.09	0.06	0.06		
Average	14.09	4.72	14.09	0.06	0.06		

Nangphat S.  
(Mr.Nangphat Sathitap)

Environmental Field Station (2)

FORM NO. F-10-002 REVISION NO. 2 ISSUE DATE: 2019/10

ALS Laboratory Group



## EMISSION TEST RESULT

Client	Guif JP NB Co., Ltd.	Run #	3
Date	07 Oct 22	Location	HONG 21
Start Time	11:07	Test Operator	Nangphat S.
CO <sub>2</sub> Analyzer Model	TELEDYNE API 100BH	Flash Time	12-12
NO <sub>x</sub> /CO <sub>2</sub> Analyzer Model	TELEDYNE API 200BH	Serial No.	282
CO/CO <sub>2</sub> Analyzer Model	TELEDYNE API 300BH	Serial No.	300

Time (s)	CO <sub>2</sub> (%)	CO <sub>2</sub> (%)	NO <sub>x</sub> (ppm)	NO <sub>x</sub> (ppm)	CO (ppm)	CO (ppm)	Remark
12:17	14.31	4.53	8.16	0.05	0.05		
12:18	14.31	4.56	7.84	0.05	0.05		
12:19	14.31	4.57	8.03	0.05	0.05		
12:20	14.31	4.56	8.04	0.05	0.05		
12:21	14.31	4.56	8.05	0.05	0.05		
12:22	14.31	4.57	8.45	0.05	0.05		
12:23	14.31	4.53	8.31	0.05	0.05		
12:24	14.31	4.51	8.27	0.04	0.04		
12:25	14.31	4.55	8.28	0.05	0.05		
12:26	14.31	4.51	8.25	0.05	0.05		
12:27	14.31	4.52	8.36	0.05	0.05		
12:28	14.31	4.56	8.58	0.05	0.05		
12:29	14.31	4.59	8.74	0.07	0.07		
12:30	14.31	4.59	8.88	0.08	0.08		
12:31	14.31	4.52	8.50	0.07	0.07		
12:32	14.31	4.55	8.40	0.07	0.07		
12:33	14.31	4.55	8.44	0.07	0.07		
12:34	14.31	4.59	8.40	0.07	0.07		
12:35	14.31	4.54	8.39	0.06	0.06		
12:36	14.31	4.52	8.09	0.07	0.07		
12:37	14.31	4.52	8.13	0.05	0.05		
12:38	14.31	4.52	8.13	0.05	0.05		
12:39	14.31	4.52	8.13	0.05	0.05		
12:40	14.31	4.52	8.13	0.05	0.05		
12:41	14.31	4.52	8.13	0.05	0.05		
12:42	14.31	4.52	8.13	0.05	0.05		
12:43	14.31	4.52	8.13	0.05	0.05		
12:44	14.31	4.52	8.13	0.05	0.05		
12:45	14.31	4.52	8.13	0.05	0.05		
12:46	14.31	4.52	8.13	0.05	0.05		
12:47	14.31	4.52	8.13	0.05	0.05		
12:48	14.31	4.52	8.13	0.05	0.05		
12:49	14.31	4.52	8.13	0.05	0.05		
12:50	14.31	4.52	8.13	0.05	0.05		
12:51	14.31	4.52	8.13	0.05	0.05		
12:52	14.31	4.52	8.13	0.05	0.05		
12:53	14.31	4.52	8.13	0.05	0.05		
12:54	14.31	4.52	8.13	0.05	0.05		
12:55	14.31	4.52	8.13	0.05	0.05		
12:56	14.31	4.52	8.13	0.05	0.05		
12:57	14.31	4.52	8.13	0.05	0.05		
12:58	14.31	4.52	8.13	0.05	0.05		
12:59	14.31	4.52	8.13	0.05	0.05		
13:00	14.31	4.52	8.13	0.05	0.05		
Average	14.31	4.57	8.59	0.06	0.06		

Nangphat S.  
(Mr.Nangphat Sathitap)

Environmental Field Station (2)

FORM NO. F-10-002 REVISION NO. 2 ISSUE DATE: 2019/10

ALS Laboratory Group



## ANALYZER CALIBRATION DATA

Client	Guif JP NB Co., Ltd.	Location	HONG 21
Date	28 Oct 22	Test Operator	Nangphat S.
CO <sub>2</sub> ANALYZER Model	TELEDYNE API 100BH	Serial No.	282
CO/CO <sub>2</sub> ANALYZER Model	TELEDYNE API 300BH	Serial No.	300

Cylinder Value (%)	Initial Analyze Calibration Response (%)	Final Analyze Calibration Response (%)	Difference (Percent of Span)
Zero Gas	0.00	0.00	0.00
Span Gas	15.00	15.00	0.00

CO <sub>2</sub> ANALYZER Model	TELEDYNE API 100BH	Serial No.	282
Span (ppm)	200		

Cylinder Value (ppm)	Initial Analyze Calibration Response (ppm)	Final Analyze Calibration Response (ppm)	Difference (Percent of Span)
Zero Gas	0.00	0.00	0.00
Span Gas	150.00	150.00	0.00

CO <sub>2</sub> ANALYZER Model	TELEDYNE API 100BH	Serial No.	282
Span (ppm)	200		

Cylinder Value (ppm)	Initial Analyze Calibration Response (ppm)	Final Analyze Calibration Response (ppm)	Difference (Percent of Span)
Zero Gas	0.00	0.00	0.00
Span Gas	150.00	150.00	0.00

CO <sub>2</sub> ANALYZER Model	TELEDYNE API 300BH	Serial No.	300
Span (ppm)	200		

Cylinder Value (ppm)	Initial Analyze Calibration Response (ppm)	Final Analyze Calibration Response (ppm)	Difference (Percent of Span)
Zero Gas	0.00	0.00	0.00
Span Gas	150.00	150.00	0.00

Calibrated by  
Nangphat S.  
(Mr.Nangphat Sathitap)

Environmental Field Station (2)

FORM NO. F-10-002 REVISION NO. 2 ISSUE DATE: 2019/10

ALS Laboratory Group



## SYSTEM CALIBRATION BIAS AND DRIFT DATA

Client	Guif JP NB Co., Ltd.	Run #	2
Date	28 Oct 22	Location	HONG 21
Start Time	11:08	Test Operator	Nangphat S.
CO <sub>2</sub> ANALYZER Model	TELEDYNE API 100BH	Flash Time	12-12
NO <sub>x</sub> /CO <sub>2</sub> ANALYZER Model	TELEDYNE API 200BH	Serial No.	282
CO/CO <sub>2</sub> ANALYZER Model	TELEDYNE API 300BH	Serial No.	300

Cylinder Value (%)	Initial Values	Final Values	Difference (%)
Zero Gas	0.00	0.00	0.00
Span Gas	15.00	15.00	0.00

Cylinder Value (ppm)	Initial Values	Final Values	Difference (%)
Zero Gas	0.00	0.00	0.00
Span Gas	150.00	150.00	0.00

Cylinder Value (ppm)	Initial Values	Final Values	Difference (%)
Zero Gas	0.00	0.00	0.00
Span Gas	150.00	150.00	0.00

Cylinder Value (ppm)	Initial Values	Final Values	Difference (%)
Zero Gas	0.00	0.00	0.00
Span Gas	150.00	150.00	0.00

Cylinder Value (ppm)	Initial Values	Final Values	Difference (%)
Zero Gas	0.00	0.00	0.00
Span Gas	150.00	150.00	0.00

Calibrated by  
Nangphat S.  
(Mr.Nangphat Sathitap)

Environmental Field Station (2)

FORM NO. F-10-002 REVISION NO. 2 ISSUE DATE: 2019/10

ALS Laboratory Group



## EMISSION TEST RESULT

Client	Guif JP NB Co., Ltd.	Run #	1
Date	28 Oct 22	Location	HONG 21
Start Time	11:08	Test Operator	Nangphat S.
CO <sub>2</sub> ANALYZER Model	TELEDYNE API 100BH	Flash Time	12-12
NO <sub>x</sub> /CO <sub>2</sub> ANALYZER Model	TELEDYNE API 200BH	Serial No.	282
CO/CO <sub>2</sub> ANALYZER Model	TELEDYNE API 300BH	Serial No.	300

Time (min)	CO <sub>2</sub> (%)	CO <sub>2</sub> (%)	NOx (ppm)	NO <sub>x</sub> (ppm)	CO (ppm)	Remark
11:08	14.07	4.74	15.09	0.35	8.35	
11:09	14.08	4.69	15.17	0.34	7.33	
11:10	14.09	4.71	15.13	0.35	7.88	
11:11	14.08	4.67	14.98	0.36	8.01	
11:12	14.07	4.71	15.28	0.34	7.71	
11:13	14.08	4.74	15.50	0.37	8.03	
11:14	14.08	4.68	15.42	0.33	8.33	
11:15	14.07	4.67	15.32	0.38	7.98	
11:16	14.08	4.75	15.43	0.34	7.79	
11:17	14.07	4.67	15.44	0.37	8.32	
11:18	14.08	4.72	15.29	0.36	8.01	
11:22	14.08	4.69	15.30	0.34	7.42	
11:23	14.05	4.69	15.23	0.37	8.45	
11:25	14.23	4.73	15.65	0.37	8.94	
11:26	14.24	4.71	15.65	0.37	7.61	
11:28	14.24	4.75	15.35	0.34	7.59	
11:27	14.24	4.77	15.12	0.34	7.55	
11:28	14.25	4.72	15.12	0.34	7.58	
11:29	14.25	4.65	14.97	0.36	8.52	
Average	14.08	4.70	15.19	0.35	7.88	







## Continuation of Calibration Certificate

Cert. No. : ACL22138  
Job No. : VC65AC0063  
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	✓	—	0.2	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

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T. Rth.

## Continuation of Calibration Certificate

Cert. No. : ACL22138  
Job No. : VC65AC0063  
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	±1.1
136.0	136.0	0.0	±1.1
135.0	135.0	0.0	±1.1
134.0	134.0	0.0	±1.1
133.0	132.9	-0.1	±1.1
132.0	131.9	-0.1	±1.1
131.0	131.0	0.0	±1.1
129.0	129.0	0.0	±1.1
124.0	124.0	0.0	±1.1
119.0	119.0	0.0	±1.1
114.0	114.0	0.0	±1.1
109.0	109.0	0.0	±1.1
104.0	104.0	0.0	±1.1
99.0	99.0	0.0	±1.1
94.0	94.0	0.0	±1.1
89.0	89.0	0.0	±1.1
84.0	84.0	0.0	±1.1
79.0	79.0	0.0	±1.1
74.0	74.0	0.0	±1.1
69.0	69.0	0.0	±1.1
64.0	64.0	0.0	±1.1
59.0	59.0	0.0	±1.1
54.0	54.0	0.0	±1.1
49.0	49.0	0.0	±1.1
44.0	44.0	0.0	±1.1
39.0	39.0	0.0	±1.1
34.0	34.0	0.0	±1.1
30.0	30.0	0.0	±1.1
29.0	28.9	-0.1	±1.1
28.0	27.9	-0.1	±1.1
27.0	27.0	0.0	±1.1
26.0	25.9	-0.1	±1.1
25.0	24.9	-0.1	±1.1

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T. Rth.

41-43/11 Sathorn Rd, Bangkok, Bangkok 10700 THAILAND  
Tel:02-433-4888 Fax:02-433-1628 e-mail:cal@www.sithiporn.com http://www.sithiporn.comCert. No. : ACL22045  
Pages : 1 of 8

## Calibration Certificate

Equipment : SOUND LEVEL METER  
Manufacturer : BION  
Model : SL-42 Microphone UC-52 Promethion N1-24  
Serial No. : 6102282 / 142975 / 221010  
ID No. : BSK-F9003

Condition As Found : GOOD

Customer : ALS LABORATORY GROUP (THAILAND) CO., LTD.  
104 PHATHANAKAN 40, PHATHANAKAN ROAD,  
KHAOYANG PHATHANAKAN, KHUET SUAN LUANG,  
BANGKOK, 10250 THAILAND.

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

Received Date : 09 JANUARY 2022  
Calibration Date : 12-14 JANUARY 2022  
Date of Issue : 17 JANUARY 2022

Calibrated by : Natthakorn Petchumai

Approved by : T. Rth.  
( Thanakorn Petchumai )

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.

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## Continuation of Calibration Certificate

Cert. No. : ACL22138  
Job No. : VC65AC0063  
Pages : 4 of 8

## Result of calibration:

## 1. Absolute sensitivity

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

## 2. Self-generated noise

Measured Value (dB)
13.8

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

Frequency Weighting	Measured value (dB)
A-weight	12.0
C-weight	19.1
Flat	24.6

## 3. Acoustical signal tests of frequency weightings

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

Frequency (Hz)	Flat	C-weight	A-weight	Acceptance Limits
125	0.1	0.2	0.2	±1.5
1000	0.0	0.0	0.0	±1.0
8000	-0.5	-0.5	-0.4	±5.0

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T. Rth.

## Continuation of Calibration Certificate

Cert. No. : ACL22138  
Job No. : VC65AC0063  
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## 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	±1.1

## 9. Tone burst response

Time Weighting	Time burst duration, T <sub>b</sub> (ms)	Cycle	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	2	1	108.0	107.9	-0.1	1.5; -5.0
	2	8	117.0	117.0	0.0	3.0; -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 one signal	Anticipated Value (dB)	Measured Value, L <sub>peak</sub> (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	-
One	136.4	135.6	-0.8	±3.0

Number of cycle in one 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	135.1	-0.3	±2.0
Negative half cycle	135.4	135.1	-0.3	±2.0

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## Continuation of Calibration Certificate

Cert. No. : ACL22138  
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Pages : 5 of 8

## 4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz

Frequency (Hz)	Flat	C-weight	A-weight	Acceptance Limits
63	0.0	-0.1	-0.1	±2.0
125	-0.1	0.0	0.0	±1.5
250	0.0	0.0	-0.1	±1.5
500	0.0	0.0	-0.1	±1.5
1000	0.0	0.0	0.0	±1.0
2000	0.0	0.0	0.0	±2.0
4000	0.0	0.0	0.0	±3.0
8000	0.0	0.1	0.1	±5.0

## 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 weightings 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
1eq	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	±0.3

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T. Rth.

## Continuation of Calibration Certificate

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## 11. Overload indication

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

## 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	±0.3

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

QP-TS12-04-04-02064

T. Rth.

## Continuation of Calibration Certificate

Cert. No. : ACL22045  
Job No. : VC65AC0063  
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	✓	—	0.2	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

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T. Rth.

QP-TS12-04-04-02064

T. Rth.



## Continuation of Calibration Certificate

Cert. No. : ACL22045  
Job No. : VC65AC0041  
Pages : 4 of 8

## Result of calibration :

## 1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limits (dB)
93.9 (93.96)	93.9	-0.0	±0.3

## 2. Self-generated noise

## 2.1 Normal test

Measured Value (dB)
13.4

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

Frequency Weighting (dB)	Measured value (dB)
A-weight	13.1
C-weight	19.5
Flat	25.0

## 3. Acoustical signal tests of frequency weightings

Meter free-field acoustic response at a level of 94 dB

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance limits
125	0.3	0.4	0.4	± 1.5
1000	-0.1	-0.1	-0.1	± 1.0
8000	-2.0	-1.9	-1.9	±3.0

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T. Petchum

## Continuation of Calibration Certificate

Cert. No. : ACL22045  
Job No. : VC65AC0041  
Pages : 5 of 8

## 4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz

Frequency (Hz)	Flat	C-weight	A-weight	Acceptance Limits (dB)
63	-0.1	0.0	0.0	±2.0
125	0.0	0.0	0.0	±1.5
250	0.0	0.0	0.0	±1.5
500	0.0	0.0	0.0	±1.5
1000	0.0	0.0	0.0	±1.0
2000	0.0	0.1	0.0	±2.0
4000	0.0	0.0	0.0	±2.0
8000	0.0	0.1	0.1	±5.0

## 5. Frequency and time weightings at 1 kHz

## 5.1 Frequency weightings at 1 kHz

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

## 5.2 Time weightings at 1 kHz

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

## 6. Long-term stability

Frequency Weighting (dB)	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A-weight	94.0	94.0	0.0	±0.3

QP-TS12-04-04-02064

T. Petchum

## Continuation of Calibration Certificate

Cert. No. : ACL22045  
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## 7. Level linearity on the reference level range

Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
117.0	117.0	0.0	±1.1
116.0	116.0	0.0	±1.1
115.0	115.0	0.0	±1.1
114.0	114.0	0.0	±1.1
113.0	113.0	0.0	±1.1
112.0	112.0	0.0	±1.1
111.0	111.0	0.0	±1.1
110.0	110.0	0.0	±1.1
109.0	109.0	0.0	±1.1
108.0	108.0	0.0	±1.1
107.0	107.0	0.0	±1.1
106.0	106.0	0.0	±1.1
105.0	105.0	0.0	±1.1
104.0	104.0	0.0	±1.1
103.0	103.0	0.0	±1.1
102.0	102.0	0.0	±1.1
101.0	101.0	0.0	±1.1
100.0	100.0	0.0	±1.1
99.0	99.0	0.0	±1.1
98.0	98.0	0.0	±1.1
97.0	97.0	0.0	±1.1
96.0	96.0	0.0	±1.1
95.0	95.0	0.0	±1.1
94.0	94.0	0.0	±1.1
93.0	93.0	0.0	±1.1
92.0	92.0	0.0	±1.1
91.0	91.0	0.0	±1.1
90.0	90.0	0.0	±1.1
89.0	89.0	0.0	±1.1
88.0	88.0	0.0	±1.1
87.0	87.0	0.0	±1.1
86.0	86.0	0.0	±1.1
85.0	85.0	0.0	±1.1
84.0	84.0	0.0	±1.1
83.0	83.0	0.0	±1.1
82.0	82.0	0.0	±1.1
81.0	81.0	0.0	±1.1
80.0	80.0	0.0	±1.1
79.0	79.0	0.0	±1.1
78.0	78.0	0.0	±1.1
77.0	77.0	0.0	±1.1
76.0	76.0	0.0	±1.1
75.0	75.0	0.0	±1.1
74.0	74.0	0.0	±1.1
73.0	73.0	0.0	±1.1
72.0	72.0	0.0	±1.1
71.0	71.0	0.0	±1.1
70.0	70.0	0.0	±1.1
69.0	69.0	0.0	±1.1
68.0	68.0	0.0	±1.1
67.0	67.0	0.0	±1.1
66.0	66.0	0.0	±1.1
65.0	65.0	0.0	±1.1
64.0	64.0	0.0	±1.1
63.0	63.0	0.0	±1.1
62.0	62.0	0.0	±1.1
61.0	61.0	0.0	±1.1
60.0	60.0	0.0	±1.1
59.0	59.0	0.0	±1.1
58.0	58.0	0.0	±1.1
57.0	57.0	0.0	±1.1
56.0	56.0	0.0	±1.1
55.0	55.0	0.0	±1.1
54.0	54.0	0.0	±1.1
53.0	53.0	0.0	±1.1
52.0	52.0	0.0	±1.1
51.0	51.0	0.0	±1.1
50.0	50.0	0.0	±1.1
49.0	49.0	0.0	±1.1
48.0	48.0	0.0	±1.1
47.0	47.0	0.0	±1.1
46.0	46.0	0.0	±1.1
45.0	45.0	0.0	±1.1
44.0	44.0	0.0	±1.1
43.0	43.0	0.0	±1.1
42.0	42.0	0.0	±1.1
41.0	41.0	0.0	±1.1
40.0	40.0	0.0	±1.1
39.0	39.0	0.0	±1.1
38.0	38.0	0.0	±1.1
37.0	37.0	0.0	±1.1
36.0	36.0	0.0	±1.1
35.0	35.0	0.0	±1.1
34.0	34.0	0.0	±1.1
33.0	33.0	0.0	±1.1
32.0	32.0	0.0	±1.1
31.0	31.0	0.0	±1.1
30.0	30.0	0.0	±1.1
29.0	29.0	0.0	±1.1
28.0	28.0	0.0	±1.1
27.0	27.0	0.0	±1.1
26.0	26.0	0.0	±1.1
25.0	25.0	0.0	±1.1
24.0	24.0	0.0	±1.1
23.0	23.0	0.0	±1.1
22.0	22.0	0.0	±1.1
21.0	21.0	0.0	±1.1
20.0	20.0	0.0	±1.1
19.0	19.0	0.0	±1.1
18.0	18.0	0.0	±1.1
17.0	17.0	0.0	±1.1
16.0	16.0	0.0	±1.1
15.0	15.0	0.0	±1.1
14.0	14.0	0.0	±1.1
13.0	13.0	0.0	±1.1
12.0	12.0	0.0	±1.1
11.0	11.0	0.0	±1.1
10.0	10.0	0.0	±1.1
9.0	9.0	0.0	±1.1
8.0	8.0	0.0	±1.1
7.0	7.0	0.0	±1.1
6.0	6.0	0.0	±1.1
5.0	5.0	0.0	±1.1
4.0	4.0	0.0	±1.1
3.0	3.0	0.0	±1.1
2.0	2.0	0.0	±1.1
1.0	1.0	0.0	±1.1
0.0	0.0	0.0	±1.1
-1.0	-1.0	0.0	±1.1
-2.0	-2.0	0.0	±1.1
-3.0	-3.0	0.0	±1.1
-4.0	-4.0	0.0	±1.1
-5.0	-5.0	0.0	±1.1
-6.0	-6.0	0.0	±1.1
-7.0	-7.0	0.0	±1.1
-8.0	-8.0	0.0	±1.1
-9.0	-9.0	0.0	±1.1
-10.0	-10.0	0.0	±1.1
-11.0	-11.0	0.0	±1.1
-12.0	-12.0	0.0	±1.1
-13.0	-13.0	0.0	±1.1
-14.0	-14.0	0.0	±1.1
-15.0	-15.0	0.0	±1.1
-16.0	-16.0	0.0	±1.1
-17.0	-17.0	0.0	±1.1
-18.0	-18.0	0.0	±1.1
-19.0	-19.0	0.0	±1.1
-20.0	-20.0	0.0	±1.1
-21.0	-21.0	0.0	±1.1
-22.0	-22.0	0.0	±1.1
-23.0	-23.0	0.0	±1.1
-24.0	-24.0	0.0	±1.1
-25.0	-25.0	0.0	±1.1
-26.0	-26.0	0.0	±1.1
-27.0	-27.0	0.0	±1.1
-28.0	-28.0	0.0	±1.1
-29.0	-29.0	0.0	±1.1
-30.0	-30.0	0.0	±1.1
-31.0	-31.0	0.0	±1.1
-32.0	-32.0	0.0	±1.1
-33.0	-33.0	0.0	±1.1
-34.0	-34.0	0.0	±1.1
-35.0	-35.0	0.0	±1.1
-36.0	-36.0	0.0	±1.1
-37.0	-37.0	0.0	±1.1
-38.0	-38.0	0.0	±1.1
-39.0	-39.0	0.0	±1.1
-40.0	-40.0	0.0	±1.1
-41.0	-41.0	0.0	±1.1
-42.0	-42.0	0.0	±1.1
-43.0	-43.0	0.0	±1.1
-44.0	-44.0	0.0	±1.1
-45.0	-45.0	0.0	±1.1
-46.0	-46.0	0.0	±1.1
-47.0	-47.0	0.0	±1.1
-48.0	-48.0	0.0	±1.1
-49.0	-49.0	0.0	±1.1
-50.0	-50.0	0.0	±1.1
-51.0	-51.0	0.0	±1.1
-52.0	-52.0	0.0	±1.1
-53.0	-53.0	0.0	±1.1
-54.0	-54.0	0.0	±1.1
-55.0	-55.0	0.0	±1.1
-56.0	-56.0	0.0	±1.1
-57.0	-57.0	0.0	±1.1
-58.0	-58.0	0.0	±1.1
-59.0	-59.0	0.0	±1.1
-60.0	-60.0	0.0	±1.1
-61.0	-61.0	0.0	±1.1
-62.0	-62.0	0.0	±1.1
-63.0	-63.0	0.0	±1.1
-64.0	-64.0	0.0	±1.1
-65.0	-65.0	0.0	±1.1
-66.0	-66.0	0.0	±1.1
-67.0	-67.0	0.0	±1.1
-68.0	-68.0	0.0	±1.1
-69.0	-69.0	0.0	±1.1
-70.0	-70.0	0.0	±1.1
-71.0	-71.0	0.0	±1.1
-72.0	-72.0	0.0	±1.1
-73.0	-73.0	0.0	±1.1
-74.0	-74.0	0.0	±1.1
-75.0	-75.0	0.0	±1.1
-76.0	-76.0	0.0	±1.1
-77.0	-77.0	0.0	±1.1
-78.0	-78.0	0.0	±1.1
-79.0	-79.0	0.0	±1.1
-80.0	-80.0	0.0	±1.1
-81.0	-81.0	0.0	±1.1
-82.0	-82.0	0.0	±1.1
-83.0	-83.0	0.0	±1.1
-84.0	-84.0	0.0	±1.1
-85.0	-85.0	0.0	±1.1
-86.0	-86.0	0.0	±1.1
-87.0	-87.0	0.0	±1.1
-88.0	-88.0	0.0	±1.1
-89.0	-89.0	0.0	±1.1
-90.0	-90.0	0.0	±1.1
-91.0	-91.0	0.0	±1.1
-92.0	-92.0	0.0	±1.1
-93.0	-93.0	0.0	±1.1
-94.0	-94.0	0.0	±1.1
-95.0	-95.0	0.0	±1.1
-96.0	-96.0	0.0	±1.1
-97.0	-97.0	0.0	±1.1
-98.0	-98.0	0.0	±1.1
-99.0	-99.0	0.0	±1.1
-100.0	-100.0	0.0	±1.1
-101.0	-101.0	0.0	±1.1
-102.0	-102.0	0.0	±1.1
-103.0	-103.0	0.0	±1.1
-104.0	-104.0	0.0	±1.1
-105.0	-105.0	0.0	±1.1
-106.0	-106.0	0.0	±1.1
-107.0	-107.0	0.0	±1.1
-108.0	-108.0	0.0	±1.1
-109.0	-109.0	0.0	±1.1
-110.0	-110.0	0.0	±1.1
-111.0	-111.0	0.0	±1.1
-112.0	-112.0	0.0	±1.1
-113.0	-113.0	0.0	±1.1
-114.0	-114.0	0.0	±1.1
-115.0	-115.0	0.0	±1.1
-116.0	-116.0	0.0	±1.1
-117.0	-117.0	0.0	±1.1
-118.0	-118.0	0.0	±1.1
-119.0	-119.0	0.0	±1.1
-120.0	-120.0	0.0	±1.1
-121.0	-121.0	0.0	±1.1
-122.0	-122.0	0.0	±1.1
-123.0	-123.0	0.0	±1.1
-124.0	-124.0	0.0	±1.1
-125.0	-125.0	0.0	±1.1
-126.0	-126.0	0.0	±1.1
-127.0	-127.0	0.0	±1.1
-128.0	-128.0	0.0	±1.1
-129.0	-129.0	0.0	±1.1
-130.0	-130.0	0.0	±1.1
-131.0	-131.0	0.0	±1.1
-132.0	-132.0	0.0	±1.1
-133.0	-133.0	0.0	±1.1
-134.0	-134.0	0.0	±1.1
-135.0	-135.0	0.0	±1.1
-136.0	-136.0	0.0	±1.1
-137.0	-137.0	0.0	±1.1
-138.0	-138.0	0.0	±1.1
-139.0	-139.0	0.0	±1.1
-140.0	-140.0	0.0	±1.1
-141.0	-141.0	0.0	±1.1
-142.0	-142.0	0.0	±1.1
-143.0	-143.0	0.0	±1.1
-144.0	-144.0	0.0	±1.1
-145.0	-145.0	0.0	±1.1
-146.0	-146.0	0.0	±1.1
-147.0	-147.0	0.0	±1.1
-148.0	-148.0	0.0	±1.1
-149.0	-149.0	0.0	±1.1
-150.0	-150.0	0.0	±1.1
-151.0	-151.0	0.0	±1.1
-152.0	-152.0	0.0	±1.1
-153.0	-153.0	0.0	±1.1
-154.0	-154.0	0.0	±1.1
-155.0	-155.0	0.0	±1.1
-156.0	-156.0	0.0	±1.1
-157.0	-157.0	0.0	±1.1
-158.0	-158.0	0.0	±1.1
-159.0	-159.0	0.0	±1.1
-160.0	-160.0	0.0	±1.1
-161.0	-161.0	0.0	±1.1
-162.0	-162.0	0.0	±1.1
-163.0	-163.0	0.0	±1.1
-164.0	-164.0	0.0	±1.1
-165.0	-165.0	0.0	±1.1
-166.0	-166.0	0.0	±1.1
-167.0	-167.0	0.0	±1.1
-168.0	-168.0	0.0	±1.1
-169.0	-169.0	0.0	±1.1
-170.0	-170.0	0.0	±1.1
-171.0	-171.0	0.0	±1.1
-172.0	-172.0	0.0	±1.1
-173.0	-173.0	0.0	±1.1
-174.0	-174.0	0.0	±1.1
-175.0	-175.0	0.0	±1.1
-176.0	-176.0	0.0	±1.1
-177.0	-177.0	0.0	±1.1
-178.0	-178.0	0.0	±1.1
-179.0	-179.0	0.0	±1.1
-180.0	-180.0	0.0	±1.1
-181.0	-181.0	0.0	±1.1
-182.0	-182.0	0.0	±1.1
-183.0	-183.0	0.0	±1.1
-184.0	-184.0	0.0	±1.1
-185.0	-185.0	0.0	±1.1
-186.0	-186.0	0.0	±1.1
-187.0	-187.0	0.0	±1.1
-188.0	-188.0	0.0	±1.1
-189.0	-189.0	0.0	±1.1
-190.0	-190.0	0.0	±1.1
-191.0	-191.0	0.0	±1.1
-192.0	-192.0	0.0	±1.1
-193.0	-193.0	0.0	±1.1
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## 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	±2.0
125	0.0	0.0	0.0	±1.5
250	0.0	0.0	0.0	±1.5
500	0.0	0.0	0.0	±1.5
1000	0.0	0.0	0.0	±2.0
2000	0.0	0.0	0.0	±2.0
4000	0.0	0.0	0.0	±3.0
8000	0.0	0.1	0.1	±5.0

## 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	±0.3

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## 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	±1.3
136.0	136.0	0.0	±1.3
135.0	135.0	0.0	±1.3
134.0	134.0	0.0	±1.3
133.0	133.0	0.0	±1.3
132.0	131.9	-0.1	±1.3
131.0	131.0	0.0	±1.3
129.0	129.0	0.0	±1.3
124.0	124.0	0.0	±1.3
119.0	119.0	0.0	±1.3
114.0	114.0	0.0	±1.3
109.0	109.0	0.0	±1.3
104.0	104.0	0.0	±1.3
99.0	99.0	0.0	±1.3
94.0	94.0	0.0	±1.3
89.0	89.0	0.0	±1.3
84.0	84.0	0.0	±1.3
79.0	79.0	0.0	±1.3
74.0	74.0	0.0	±1.3
69.0	69.0	0.0	±1.3
64.0	64.0	0.0	±1.3
59.0	59.0	0.0	±1.3
54.0	54.0	0.0	±1.3
49.0	49.0	0.0	±1.3
44.0	44.0	0.0	±1.3
39.0	39.0	0.0	±1.3
34.0	34.0	0.0	±1.3
29.0	29.1	0.1	±1.3
24.0	24.1	0.1	±1.3
19.0	19.1	0.1	±1.3
14.0	14.1	0.1	±1.3
9.0	9.1	0.1	±1.3
4.0	4.1	0.1	±1.3
-1.0	-1.1	-0.1	±1.3
-6.0	-6.1	-0.1	±1.3
-11.0	-11.1	-0.1	±1.3
-16.0	-16.2	-0.2	±1.3
-21.0	-21.2	-0.2	±1.3

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## 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	±1.3

## 9. Time burst response

Time Weighting	Test burst duration, Th (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
Slow	200	800	134.0	134.0	0.0	±0.0
	2	8	108.0	108.0	0.0	1.5; -5.0
SEL	200	800	127.6	127.6	0.0	±0.0
	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	±0.0

## 10. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, Leqpeak (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	-
One	136.4	136.2	-0.2	±3.0

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	135.1	-0.3	±2.0
Negative half cycle	135.4	135.2	-0.2	±2.0

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## 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	±0.3

This 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

SITHIPORN ASSOCIATES CO.,LTD.  
CALIBRATION LABORATORY43/145/11 Sukhumvit Rd., Bangkok, Bangkok 10110 Thailand  
Tel: 02-253-8895 Fax: 02-253-1679 E-mail: cal@sitiporn.com http://www.sitiporn.comCert. No. : ACL21147  
Pages : 1 of 8

## Calibration Certificate

Equipment : SOUND LEVEL METER  
Manufacturer : BION  
Model : SL-02 / Microphone UC-52 / Preamplifier NH-24  
Serial No. : 0058242 / 157782 / 40907  
ID No. : BKK\_P50099

Condition As Found : GOOD

Customer : A.S. LABORATORY GROUP (THAILAND) CO., LTD.  
104 PHATTANAKAN 40, PHATTANAKAN ROAD,  
KHWAENG PHATTANAKAN, KHUET SUAN LUANG,  
BANGKOK, 10250 THAILAND.

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

Received Date : 06 JULY 2022  
Calibration Date : 11-18 JULY 2022  
Date of Issue : 19 JULY 2022

Calibrated by : Nattakorn Pichanpong

Approved by : T. Petch.  
( Thanakul Petchanong )

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.

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Job No. : VCSAC0069  
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## 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	✓	-	0.3	0.6
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	✓	-	0.3	0.6
For 10 Hz to 4 kHz	✓	-	0.3	0.7
For 4 kHz to 10 kHz	✓	-	0.3	0.7
For 10 kHz to 20 kHz	-	-	-	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. Time burst response	✓	-	0.2	0.3
10. Peak C sound level	✓	-	0.2	0.3
11. Overload indication	✓	-	0.2	0.25
12. High level stability	✓	-	0.1	0.1

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## Result of calibration :

## 1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
93.9 (93.95)	93.9	0.0	±0.3

## 2. Self-generated noise

## 2.1 Normal test

Measured Value (dB)
17.7

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

Frequency Weighting	Measured value (dB)
A-weight	16.1
C-weight	21.7
Flat	27.4

## 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	0.2	± 1.5
1000	-0.1	-0.1	-0.1	± 1.0
8000	-1.4	-1.3	-1.3	± 0.0

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## 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	±2.0
125	-0.1	0.0	0.0	±1.5
250	0.0	0.0	-0.1	±1.5
500	0.0	0.0	-0.1	±1.5
1000	0.0	0.0	0.0	±1.0
2000	0.0	0.0	0.0	±2.0
4000	0.0	0.0	0.0	±3.0
8000	0.0	0.1	0.1	±5.0

## 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	±0.3

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T. Petch.



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Job No. : VCSAC0069  
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## 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	±1.3
136.0	136.0	0.0	±1.3
135.0	135.0	0.0	±1.3
134.0	134.0	0.0	±1.3
133.0	133.0	0.0	±1.3
132.0	132.0	0.0	±1.3
131.0	131.0	0.0	±1.3
129.0	129.0	0.0	±1.3
124.0	124.0	0.0	±1.3
119.0	119.0	0.0	±1.3
114.0	114.0	0.0	±1.3
109.0	109.0	0.0	±1.3
104.0	104.0	0.0	±1.3
99.0	99.0	0.0	±1.3
94.0	94.0	0.0	±1.3
89.0	89.0	0.0	±1.3
84.0	84.0	0.0	±1.3
79.0	79.0	0.0	±1.3
74.0	74.0	0.0	±1.3
69.0	69.0	0.0	±1.3
64.0	64.0	0.0	±1.3
59.0	59.0	0.0	±1.3
54.0	54.0	0.0	±1.3
49.0	49.0	0.0	±1.3
44.0	44.0	0.0	±1.3
39.0	39.0	0.0	±1.3
34.0	34.0	0.0	±1.3
29.0	29.0	0.0	±1.3
24.0	24.0	0.0	±1.3
19.0	19.0	0.0	±1.3
14.0	14.0	0.0	±1.3
9.0	9.0	0.0	±1.3
4.0	4.0	0.0	±1.3

Cert. No. : ACL21187  
Job No. : VCSAC0069  
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	±1.1

## 9. Time burst response

Time Weighting	Time burst duration, 1s (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
Slow	200	800	124.0	124.0	0.0	±1.0
	2	8	108.0	108.0	0.0	1.5; -3.0
SEL	200	800	127.6	127.6	0.0	±1.0
	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, Leq (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	-
One	136.4	135.4	-0.9	±1.0

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	135.1	-0.3	±2.0
Negative half cycle	135.4	135.1	-0.3	±2.0

Cert. No. : ACL21187  
Job No. : VCSAC0069  
Pages : 8 of 8

## 11. Overload indication

Measured value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Positive one-half cycle	Negative one-half cycle	
89.7	89.5	-0.2 ±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	137.6	0.6	±0.3

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

QP-TS12-04-04-02064

T. Retch.

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T. Retch.

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T. Retch.

SITHIPORN ASSOCIATES CO.,LTD.  
CALIBRATION LABORATORY451-451/1 Srinakharin Rd, Bangkok, Bangkok 10700 THAILAND  
Tel: 0-2435-8800 Fax: 0-2431-1679 e-mail: center@sitiporn.com http://www.sitiporn.comCert. No. : ACL21158  
Job No. : VCSAC0015  
Pages : 3 of 8

## Calibration Certificate

Equipment : SOUND LEVEL METER  
Manufacturer : RION  
Model : NL-42 Microphone UC-52 / Pre-amplifier NH-24  
Serial No. : 0085813 / 138763 / 58765  
ID No. : BKK FS0103

## Condition As Found :

GOOD

Customer : ALS LABORATORY GROUP (THAILAND) CO., LTD.  
104 PHATHANAKAN 40, PHATHANAKAN ROAD,  
RUWANG PHATHANAKAN, KHUJ SUAN LUANG,  
BANGKOK, 10250 THAILAND.

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

Received Date : 08 NOVEMBER 2021  
Calibration Date : 09-10 NOVEMBER 2021  
Date of Issue : 12 NOVEMBER 2021

Calibrated by : T. Retch.

Approved by : T. Retch.  
( Thakul Petchai )

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QP-TS12-04-04-02064

Cert. No. : ACL21158  
Job No. : VCSAC0015  
Pages : 2 of 8

## Calibration Procedure : CP-AC-01

## Calibration Method :

This equipment was calibrated by based on IEC-61672-2 (2013) standard for sound level meter (SLM).  
The SLM had tests to Acoustical and Electrical signal tests of frequency weighting with Anemochamber and Reference Standard Instruments.  
For tests results of each item were made by observation of each instrument 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	MY48017056	EF-0012-21	10-Feb-22
Waveform Generator	33511B	MY5202742	EF-0011-21	10-Feb-22
Digital Multimeter	33461A	MY5220504	EEL-RP-050264	09-Feb-22
Digital Multimeter	33461A	MY5220505	EEL-RP-050264	09-Feb-22
Digital Multimeter	8869A	1997025	EEL-RP-060264	05-Feb-22
Programmable Attenuator	MAT-1070	62100114	1500-07774E	08-Mar-22
Condenser Microphone	4180	2977900	AA-1008-21	05-Feb-22
Measuring Amplifier	NA-42KAI	34560495	AA-3003-21	16-Feb-22

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 acceptable 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).

QP-TS12-04-04-02064

T. Retch.

QP-TS12-04-04-02064

T. Retch.

Cert. No. : ACL21158  
Job No. : VCSAC0015  
Pages : 4 of 8

## Result of calibration :

## 1. Absolute sensitivity

Reference (Acoustic Signal) (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limits (dB)
93.0 (93.96)	93.9	0.0	±0.3

## 2. Self-generated noise

## 2.1 Normal test

Measured Value (dB)
14.6

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

Frequency Weighting	Measured value (dB)
A-weight	11.6
C-weight	17.8
Flat	23.6

## 3. Acoustical signal tests of frequency weightings

New free-field acoustic response at a level of 94 dB

Frequency (Hz)	Flat	C-weight	A-weight	Acceptance Limits (dB)
125	-0.4	0.5	0.5	±1.5
1000	-0.1	-0.1	-0.1	±1.0
8000	-2.6	-2.6	-2.6	±5.0

Cert. No. : ACL21158  
Job No. : VCSAC0015  
Pages : 5 of 8

## 4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz

Frequency (Hz)	Flat	C-weight	A-weight	Acceptance Limits (dB)
63	0.0	0.0	0.0	±2.0
125	0.0	0.0	0.0	±1.5
250	0.0	0.0	0.0	±1.5
500	0.0	0.0	-0.1	±1.5
1000	0.0	0.0	0.0	±1.0
2000	0.0	0.0	0.0	±2.0
4000	0.0	0.0	0.0	±3.0
8000	0.0	0.1	0.1	±5.0

## 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	±0.3

Cert. No. : ACL21158  
Job No. : VCSAC0015  
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	±1.3
136.0	136.0	0.0	±1.3
135.0	135.0	0.0	±1.3
134.0	134.0	0.0	±1.3
133.0	132.9	-0.1	±1.3
132.0	131.9	-0.1	±1.3
131.0	130.9	-0.1	±1.3
129.0	129.0	0.0	±1.3
124.0	124.0	0.0	±1.3
119.0	119.0	0.0	±1.3
114.0	114.0	0.0	±1.3
109.0	109.0	0.0	±1.3
104.0	104.0	0.0	±1.3
99.0	99.0	0.0	±1.3
94.0	94.0	0.0	±1.3
89.0	89.0	0.0	±1.3
84.0	84.0	0.0	±1.3
79.0	79.0	0.0	±1.3
74.0	74.0	0.0	±1.3
69.0	69.0	0.0	±1.3
64.0	64.0	0.0	±1.3
59.0	59.0	0.0	±1.3
54.0	54.0	0.0	±1.3
49.0	49.0	0.0	±1.3
44.0	44.0	0.0	±1.3
39.0	39.0	0.0	±1.3
34.0	34.0	0.0	±1.3
29.0	29.0	0.0	±1.3
24.0	24.0	0.0	±1.3
19.0	19.0	0.0	±1.3
14.0	14.0	0.0	±1.3
9.0	9.0	0.0	±1.3

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Job No. : VCSAC0033  
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	±1.1

## 9. Time burst response

Time Weighting	Time burst duration, T <sub>b</sub> (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	±0.0
Slow	2	8	108.0	108.0	0.0	1.5; -5.0
	200	800	127.8	127.6	-0.2	±0.0
	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	129.0	129.0	0.0	±0.0

## 10. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, Leqpeak (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	-
One	136.4	136.0	-0.4	±3.0

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	135.1	-0.3	±2.0
Negative half cycle	135.4	135.1	-0.3	±2.0

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T. Petchu

Cert. No. : ACL21109  
Job No. : VCSAC0033  
Pages : 8 of 8

## 11. Overload indication

Measured value ( dB )		Deviated Value ( dB )	Acceptance Limit ( dB )
Positive one-half cycle	Negative one-half cycle		
89.6	89.5	-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	±0.3

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

QP-TS12-04-04-02064

T. Petchu

431-431/1 Sitthiporn Rd., Bangkum, Bangkok 10700 THAILAND  
Tel: 02-2635-0000 Fax: 02-2631-8279 e-mail: cal-center@sithiporn.com http://www.sithiporn.comCert. No. : ACL21109  
Pages : 1 of 8

## Calibration Certificate

Equipment : SOUND LEVEL METER  
Manufacturer : RION  
Model : NL-42 / Microphone UC-52 / Preamplifier NH-24  
Serial No. : 0085820 / 158771 / 58772  
ID No. : RKC, ISO110

Condition As Found : GOOD

Customer : A.S. LABORATORY GROUP (THAILAND) CO., LTD.  
104 PHATHANAKAN 40, PHATHANAKAN ROAD,  
KHUANG PHATHANAKAN, KHUANG SUAN LUANG,  
BANGKOK, 10250 THAILAND.Location :  
Ambient Temperature : ( 23.0 ± 3 ) °C  
Pressure : ( 101.3 ± 3 ) kPa  
Relative Humidity : ( 50.0 ± 2.0 ) %  
Received Date : 09 DECEMBER 2021  
Calibration Date : 14-15 DECEMBER 2021  
Date of Issue : 16 DECEMBER 2021RECEIVED BY  
APPROVED BY  
EFFECTIVE DATE

Calibrated by : Nithakorn Pichanont

Approved by : T. Petchu  
( Thanakul Petchu )

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QP-TS12-04-04-02064

Cert. No. : ACL21109  
Job No. : VCSAC0033  
Pages : 2 of 8

## Calibration Procedure : CP-AC-01

## Calibration Method :

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

For test results of each item were made by observation of each instrument display and also with SLM's display.

## Condition of this result of calibration :

## 1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Exp. Date
Waveform Generator	33210A	MY48017076	ET-0012-21	10-Feb-22
Waveform Generator	33511B	MY52302742	ET-001-21	10-Feb-22
Digital Multimeter	33461A	MY53220104	EEL-BP_050264	10-Feb-22
Digital Multimeter	33461A	MY53220076	EEL-BP_030264	06-Feb-22
Digital Multimeter	8946A	1907025	EEL-BP_060264	05-Feb-22
Programmable Attenuator	MA7-407B	42160114	1500-07744E	08-Mar-22
Condenser Microphone	4180	297900	AA-1008-21	05-Feb-22
Measuring Amplifier	NA-02KA	34560495	AA-5003-21	16-Feb-22

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).

QP-TS12-04-04-02064

T. Petchu

Cert. No. : ACL21109  
Job No. : VCSAC0033  
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	✓	-	0.3	0.6
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	✓	-	0.3	0.6
For 10 Hz to 4 kHz	✓	-	0.3	0.6
For > 4 kHz to 10 kHz	✓	-	0.3	0.5
For > 10 kHz to 20 kHz	-	-	-	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 at the reference level range	✓	-	0.2	0.3
8. Level linearity including the level range control	✓	-	0.2	0.3
9. Time 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

QP-TS12-04-04-02064

T. Petchu

Cert. No. : ACL21109  
Job No. : VCSAC0033  
Pages : 4 of 8

## Result of calibration :

## 1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
93.9 (93.96)	93.9	0.0	±0.3

## 2. Self-generated noise

## 2.1 Normal test

Measured Value (dB)
16.6

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	16.9
Flat	22.6

## 3. Acoustical signal tests of frequency weightings

Motor free-field acoustic response at a level of 94 dB

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
125	0.4	0.4	0.3	± 1.5
1000	0.0	0.0	0.0	± 1.0
8000	-1.3	-1.2	-1.2	±5.0

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T. Petchu



Cert. No. : ACL21173  
Job No. : VCRAC0803  
Pages : 8 of 8

#### 11. Overall indication

Measured value (dB)	Deviation 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)	Deviation Value (dB)	Acceptance Limits (dB)
A-weight	137.0	137.0	0.0	±0.3

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

451/41/1 Sathorn Rd., Bangkok, Bangkok 10120 THAILAND  
Tel:02-615-8800 Fax:02-615-1679 e-mail:cal-center@sithiporn.com http://www.sithiporn.com



Cert. No. : ACL21173  
Pages : 1 of 8

### Calibration Certificate

Equipment : SOUND LEVEL METER  
Manufacturer : RION  
Model : NL-42 Microphone UC-52 / Pre-amplifier N10-24  
Serial No. : 0085827 / 15878 / 58779  
ID No. : BKK F50117

Condition As Found : GOOD

Customer : A.S. LABORATORY GROUP (THAILAND) CO., LTD  
104 PHATHANAKAN 46 PHATHANAKAN ROAD,  
KHAOYANG PHATHANAKAN, KHUET SUAN LUANG,  
BANGKOK, 10250 THAILAND.

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

Received Date : 09 DECEMBER 2021  
Calibration Date : 14-15 DECEMBER 2021  
Date of Issue : 16 DECEMBER 2021

Calibrated by : Natchanon Pongmanee

Approved by : T. Petchai

( Thankul Petchai )

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Cert. No. : ACL21173  
Job No. : VCRAC0803  
Pages : 2 of 8

Calibration Procedure : CP-AC-01

#### Calibration Method :

This equipment was calibrated by based on IEC-61672-3 (2017) 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 test results of each item were made by observation of each instrument 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	MY40017076	EF-0012-21	10-Feb-22
Waveform Generator	33311B	MY5202342	EF-0011-21	10-Feb-22
Digital Multimeter	33461A	MY5202104	EEL-IP-050264	10-Feb-22
Digital Multimeter	33461A	MY5202076	EEL-IP-050264	10-Feb-22
Digital Multimeter	4888A	1907025	EEL-IP-060264	09-Feb-22
Programmable Attenuator	MAT-1070	42100114	1500-07774E	09-Mar-22
Condenser Microphone	4180	2977000	AA-1008-21	15-Feb-22
Measuring Amplifier	NA-42KA	34560495	AA-0903-21	16-Feb-22

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).

Cert. No. : ACL21173  
Job No. : VCRAC0803  
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	✓	-	0.2	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	-	-	-	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. Time burst response	✓	-	0.2	0.3
10. Peak C-weight level	✓	-	0.2	0.35
11. Overall indication	✓	-	0.2	0.25
12. High level of stability	✓	-	0.1	0.1

Cert. No. : ACL21173  
Job No. : VCRAC0803  
Pages : 4 of 8

#### Result of calibration :

##### 1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.9 (93.96)	93.9	0.0	±0.3

##### 2. Self-generated noise

###### 2.1 Normal test

Measured Value (dB)
16.8

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

Frequency Weighting	Measured Value (dB)
A-weight	14.2
C-weight	17.4
Flat	21.0

##### 3. Acoustical signal tests of frequency weightings

Mean free-field acoustic response at a level of 94 dB

Frequency (Hz)	Flat	C-weight	A-weight	Acceptance Limits
125	1.0	1.0	1.0	±1.5
1000	0.0	0.0	0.0	±1.0
8000	-3.1	-3.1	-3.0	±5.0

Cert. No. : ACL21173  
Job No. : VCRAC0803  
Pages : 5 of 8

#### 4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz

Frequency (Hz)	Flat	C-weight	A-weight	Acceptance Limits
63	0.0	-0.1	0.0	±2.0
125	0.0	0.0	0.0	±1.5
250	0.0	0.0	0.0	±1.5
500	0.0	0.0	0.0	±1.5
1000	0.0	0.0	0.0	±1.0
2000	0.0	0.1	0.0	±2.0
4000	0.0	0.0	0.0	±2.0
8000	0.0	0.1	0.1	±5.0

##### 5. Frequency and time weightings at 1 kHz

###### 5.1 Frequency weightings at 1 kHz

Frequency Weighting	Measured Value (dB)	Deviation Value (dB)	Acceptance Limits
A-weight	94.0	0.0	±0.2
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)	Deviation Value (dB)	Acceptance Limits
Fast	94.0	0.0	±0.1
Slow	94.0	0.0	±0.1
Log	94.0	0.0	±0.1

##### 6. Long-term stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviation Value (dB)	Acceptance Limits (dB)
A-weight	94.0	94.0	0.0	±0.3

Cert. No. : ACL21173  
Job No. : VCRAC0803  
Pages : 6 of 8

#### 7. Level linearity on the reference level range

Anticipated Value (dB)	Measured Value (dB)	Deviation Value (dB)	Acceptance Limits (dB)
137.0	137.0	0.0	±1.5
136.0	136.0	0.0	±1.1
135.0	135.0	0.0	±1.1
134.0	134.0	0.0	±1.1
133.0	133.0	0.0	±1.1
132.0	132.0	0.0	±1.1
131.0	131.0	0.0	±1.1
129.0	129.0	0.0	±1.1
124.0	124.0	0.0	±1.1
119.0	119.0	0.0	±1.1
114.0	114.0	0.0	±1.1
109.0	109.0	0.0	±1.1
104.0	104.0	0.0	±1.1
99.0	99.0	0.0	±1.1
94.0	94.0	0.0	±1.1
89.0	89.0	0.0	±1.1
84.0	84.0	0.0	±1.1
79.0	79.0	0.0	±1.1
74.0	74.0	0.0	±1.1
69.0	69.0	0.0	±1.1
64.0	64.0	0.0	±1.1
59.0	59.0	0.0	±1.1
54.0	54.0	0.0	±1.1
49.0	49.0	0.0	±1.1
44.0	44.0	0.0	±1.1
39.0	39.0	0.0	±1.1
34.0	34.0	0.0	±1.1
29.0	29.0	-0.1	±1.1
24.0	24.0	-0.1	±1.1
19.0	19.0	-0.1	±1.1
14.0	14.0	-0.1	±1.1
9.0	9.0	-0.1	±1.1
4.0	4.0	-0.1	±1.1

Cert. No. : ACL21173  
Job No. : VCRAC0803  
Pages : 7 of 8

#### 8. Level linearity including the level range control

Range	Anticipated Value (dB)	Measured Value (dB)	Deviation Value (dB)	Acceptance Limits (dB)
Auto	94.0	94.0	0.0	±1.1

##### 9. Time burst response

Type	Time burst duration, $T_b$ (ms)	Cycle	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Weighting						
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	134.1	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
	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	128.1	0.1	±1.0

##### 10. Peak C-weight level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, L <sub>peak</sub> (dB)	Deviation Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	-
One	136.4	136.3	-0.1	±1.0

Number of cycle in test signal	Anticipated Value (dB)	Measured Value (dB)	Deviation Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	-
Positive half cycle	135.4	135.2	-0.2	±2.0
Negative half cycle	135.4	135.2	-0.2	±2.0

Cert. No. : ACL21173  
Job No. : VCRAC0803  
Pages : 8 of 8

#### 11. Overall indication

Measured value (dB)	Deviation 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)	Deviation Value (dB)	Acceptance Limits (dB)
A-weight	137.0	137.0	0.0	±0.3

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



CERTIFICATE OF CALIBRATION

ISSUED BY: Cirrus Research plc

DATE OF ISSUE: 01/11/21

CERTIFICATE NUMBER: 166111

Cirrus Research plc  
Acoustic House  
Bridlington Road  
Humby Grove  
North Yorkshire  
YO14 0PH  
United Kingdom

Page 1 of 1

Test engineer:  
Nigel Smith  
Electronically signed:

doseBadge Reader

Instrument: Cirrus Research plc  
Model Number: RC110A  
Serial Number: 9240  
Notes:

Calibration Procedure

The tests were carried out in accordance with the requirements of IEC 60942:2003 where applicable.

Date of Calibration: 01 November 2021

Functionality Results

Function	Result
Keypad	Pass
Battery Power	Pass
Display	Pass
Communication	Pass
2 way IR link	Pass
Clock	Pass

REVIEW BY: *Handwritten signature*  
APPROVED BY: *Handwritten signature*  
NEXT CAL DATE: 1/11/22

Calibration Results

Level (dB)	Frequency (Hz)	Distortion (% THD + Noise)
Initial	13.58	0.48
Adjusted	114.00	0.48
Uncertainty	$\pm 0.11$	$\pm 0.10$
Tolerances	$\pm 0.80$	$\pm 0.80$

Environmental Conditions

Pressure: 97.50 kPa  
Temperature: 20.1 °C  
Humidity: 46.6 %

Notes

This certificate provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory. The results within this certificate relate only to the items calibrated. The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a coverage probability of approximately 95%.

CERTIFICATE OF CALIBRATION

ISSUED BY: Cirrus Research plc

DATE OF ISSUE: 23 June 2022

CERTIFICATE NUMBER: 176297

Cirrus Research plc  
Acoustic House  
Bridlington Road  
Humby Grove  
North Yorkshire  
YO14 0PH  
United Kingdom

Page 1 of 1

Test engineer:  
Rebecca Thomas  
Electronically signed:

doseBadge Reader

Instrument: Cirrus Research plc  
Model Number: RC110A  
Serial Number: 77676  
Notes:

Calibration Procedure

The tests were carried out in accordance with the requirements of IEC 60942:2003 where applicable.

Date of Calibration: 23 June 2022

Functionality Results

Function	Result
Keypad	Pass
Battery Power	Pass
Display	Pass
Communication	Pass
2 way IR link	Pass
Clock	Pass

REVIEW BY: *Handwritten signature*  
APPROVED BY: *Handwritten signature*  
NEXT CAL DATE: 1/11/23

Calibration Results

Level (dB)	Frequency (Hz)	Distortion (% THD + Noise)
Initial	13.58	0.18
Adjusted	114.00	0.18
Uncertainty	$\pm 0.11$	$\pm 0.10$
Tolerances	$\pm 0.80$	$\pm 0.80$

Environmental Conditions

Pressure: 100.30 kPa  
Temperature: 22.3 °C  
Humidity: 54.6 %

Notes

This certificate provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory. The results within this certificate relate only to the items calibrated. The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a coverage probability of approximately 95%.

CERTIFICATE OF CALIBRATION

ISSUED BY: Cirrus Research plc

DATE OF ISSUE: 03/11/21

CERTIFICATE NUMBER: 166111

Cirrus Research plc  
Acoustic House  
Bridlington Road  
Humby Grove  
North Yorkshire  
YO14 0PH  
United Kingdom

Page 1 of 2

Test engineer:  
Nigel Smith  
Electronically signed:

doseBadge Reader

Instrument: Cirrus Research plc  
Model Number: RC110A  
Serial Number: 9240  
Notes:

Calibration Procedure

The tests were carried out in accordance with the requirements of IEC 60942:2003 where applicable.

Date of Calibration: 01 November 2021

Functionality Results

Function	Result
Keypad	Pass
Battery Power	Pass
Display	Pass
Communication	Pass
2 way IR link	Pass
Clock	Pass

REVIEW BY: *Handwritten signature*  
APPROVED BY: *Handwritten signature*  
NEXT CAL DATE: 1/11/22

Calibration Results

Level (dB)	Frequency (Hz)	Distortion (% THD + Noise)
Initial	13.58	0.48
Adjusted	114.00	0.48
Uncertainty	$\pm 0.11$	$\pm 0.10$
Tolerances	$\pm 0.80$	$\pm 0.80$

Environmental Conditions

Pressure: 97.50 kPa  
Temperature: 20.1 °C  
Humidity: 46.6 %

Notes

This certificate provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory. The results within this certificate relate only to the items calibrated. The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a coverage probability of approximately 95%.

CERTIFICATE OF CALIBRATION

ISSUED BY: Cirrus Research plc

DATE OF ISSUE: 03/11/21

CERTIFICATE NUMBER: 166111

Cirrus Research plc  
Acoustic House  
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Page 1 of 2

Test engineer:  
Nigel Smith  
Electronically signed:

doseBadge Reader

Instrument: Cirrus Research plc  
Model Number: RC110A  
Serial Number: 9240  
Notes:

Calibration Procedure

The tests were carried out in accordance with the requirements of IEC 60942:2003 where applicable.

Date of Calibration: 01 November 2021

Functionality Results

Function	Result
Keypad	Pass
Battery Power	Pass
Display	Pass
Communication	Pass
2 way IR link	Pass
Clock	Pass

REVIEW BY: *Handwritten signature*  
APPROVED BY: *Handwritten signature*  
NEXT CAL DATE: 1/11/22

Calibration Results

Level (dB)	Frequency (Hz)	Distortion (% THD + Noise)
Initial	13.58	0.48
Adjusted	114.00	0.48
Uncertainty	$\pm 0.11$	$\pm 0.10$
Tolerances	$\pm 0.80$	$\pm 0.80$

Environmental Conditions

Pressure: 97.50 kPa  
Temperature: 20.1 °C  
Humidity: 46.6 %

Notes

Calibration Results

Level (dB)	Frequency (Hz)	Distortion (% THD + Noise)
Initial	13.58	0.48
Adjusted	114.00	0.48
Uncertainty	$\pm 0.11$	$\pm 0.10$
Tolerances	$\pm 0.80$	$\pm 0.80$

Environmental Conditions

Pressure: 97.50 kPa  
Temperature: 20.1 °C  
Humidity: 46.6 %

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Page 1 of 2

Test engineer:  
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doseBadge Reader

Instrument: Cirrus Research plc  
Model Number: RC110A  
Serial Number: 9240  
Notes:

Calibration Procedure

The tests were carried out in accordance with the requirements of IEC 60942:2003 where applicable.

Date of Calibration: 01 November 2021

Functionality Results

Function	Result
Keypad	Pass
Battery Power	Pass
Display	Pass
Communication	Pass
2 way IR link	Pass
Clock	Pass

REVIEW BY: *Handwritten signature*  
APPROVED BY: *Handwritten signature*  
NEXT CAL DATE: 1/11/22

Calibration Results

Level (dB)	Frequency (Hz)	Distortion (% THD + Noise)
Initial	13.58	0.48
Adjusted	114.00	0.48
Uncertainty	$\pm 0.11$	$\pm 0.10$
Tolerances	$\pm 0.80$	$\pm 0.80$

Environmental Conditions

Pressure: 97.50 kPa  
Temperature: 20.1 °C  
Humidity: 46.6 %

Notes

Calibration Results

Level (dB)	Frequency (Hz)	Distortion (% THD + Noise)
Initial	13.58	0.48
Adjusted	114.00	0.48
Uncertainty	$\pm 0.11$	$\pm 0.10$
Tolerances	$\pm 0.80$	$\pm 0.80$

Environmental Conditions

Pressure: 97.50 kPa  
Temperature: 20.1 °C  
Humidity: 46.6 %

Notes

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ISSUED BY: Cirrus Research plc

DATE OF ISSUE: 03/11/21

CERTIFICATE NUMBER: 166111

Cirrus Research plc  
Acoustic House  
Bridlington Road  
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YO14 0PH  
United Kingdom

Page 1 of 2

Test engineer:  
Nigel Smith  
Electronically signed:

doseBadge Reader

Instrument: Cirrus Research plc  
Model Number: RC110A  
Serial Number: 9240  
Notes:

Calibration Procedure

The tests were carried out in accordance with the requirements of IEC 60942:2003 where applicable.

Date of Calibration: 01 November 2021

Functionality Results

Function	Result
Keypad	Pass
Battery Power	Pass
Display	Pass
Communication	Pass
2 way IR link	Pass
Clock	Pass

REVIEW BY: *Handwritten signature*  
APPROVED BY: *Handwritten signature*  
NEXT CAL DATE: 1/11/22

Calibration Results

Level (dB)	Frequency (Hz)	Distortion (% THD + Noise)
Initial	13.58	0.48
Adjusted	114.00	0.48
Uncertainty	$\pm 0.11$	$\pm 0.10$
Tolerances	$\pm 0.80$	$\pm 0.80$

Environmental Conditions

Pressure: 97.50 kPa  
Temperature: 20.1 °C  
Humidity: 46.6 %

Notes

Calibration Results

Level (dB)	Frequency (Hz)	Distortion (% THD + Noise)
Initial	13.58	0.48
Adjusted	114.00	0.48
Uncertainty	$\pm 0.11$	$\pm 0.10$
Tolerances	$\pm 0.80$	$\pm 0.80$

Environmental Conditions

Pressure: 97.50 kPa  
Temperature: 20.1 °C  
Humidity: 46.6 %

Notes

This certificate provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory. The results within this certificate relate only to the items calibrated. The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a coverage probability of approximately 95%.



Certificate No.: CL-020-65 Page 2 of 2

Result of Calibration: ☒ Without Adjustment ☐ With Adjustment

Calibration Range: 20 ~ 40 °C

Function: Table 1: This equipment was connected with wet bulb probe Model: HP3201.2 S/N: 15003284. Dimension: Diameter 14 mm, Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
30	25.067	25.1	0.0	0.099
30	25.060	25.1	0.1	0.099
30	30.042	30.1	0.1	0.099
30	35.041	35.1	0.1	0.099
30	40.031	40.1	0.1	0.099

Table 2: This equipment was connected with temperature probe Model: TP3207.2 S/N: 15000018. Dimension: Diameter 14 mm, Length 150 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
70	25.054	25.2	0.1	0.099
70	25.050	25.3	0.0	0.099
70	30.041	30.9	-0.1	0.099
70	35.041	34.6	-0.2	0.099
70	40.031	39.7	-0.3	0.099

Table 3: This equipment was connected with Globe thermometer probe Model: TP3276.2 S/N: 15000000. Dimension: Diameter 8 mm, Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
110	25.056	25.1	0.0	0.099
110	25.049	25.1	0.1	0.099
110	30.041	30.1	0.1	0.099
110	35.041	35.1	0.1	0.099
110	40.031	40.1	0.1	0.099

UUC: Limit Under Calibration. The reported expanded uncertainty is based on standard uncertainty multiplied by a coverage factor k=2 providing a level of confidence of approximately 95%.

End of Certificate



## CERTIFICATE OF CALIBRATION

Certificate No.: CL-120-65 Page 1 of 2

Equipment Name: Heat Stress Monitor Manufacturer: DataOHM Model: H320.2 Serial No: 15000318 ID No: BNA\_F30608

Customer: Name: ALS laboratory group (Thailand) Co., Ltd. Address: 104 Phrakasarak 40, Phrakasarak Rd, Khlong San Luang, Khlong San Luang, Bangkok 10250 Thailand.

Received date: 02 Jun 2022 Calibration date: 27 Jun 2022 Issue date: 27 Jun 2022

Reference Used During Calibration: 1. Standard Temperature Probe Model: STS-100 A500, Serial No: 607802-09, Due date: 29 Mar 2023 2. Digital Temperature Indicator Model: DT-1000A M, S, Serial No: 671407-00991, Due date: 04 Jun 2022

Calibration Condition: Temperature: (23.3) °C Relative Humidity: (55.1) %

Calibration Procedure: The temperature calibration was done by in-house calibration method as WGL-001, according to comparison method with standard digital temperature indicator and standard temperature probe. The temperature scale was based on ITS-90.

Traceability: The measurement results are traceable to the international system of units (SI) through National Institute of Metrology (Thailand) (NIMT) Certificate number: TT-0034-22, Certificate number: IS-0032-21

REVIEW BY: *Phatana P.* APPROVED BY: *Phatana P.* NEXT CAL DATE: 24/6/25

Calibrated by: *Mr. Somchai Thairatid* *Mr. Jiraporn Lertsomphon*

Approved Signature: *Phatana P.* Calibration Department Manager



THIS CERTIFICATE REPORT MAY NOT BE REPRODUCED EXCEPT IN FULL UNLESS PERMISSION FOR REPRODUCTION HAS BEEN OBTAINED IN WRITING FROM THE LABORATORY.

Certificate No.: CL-120-65 Page 2 of 2

Result of Calibration: ☒ Without Adjustment ☐ With Adjustment

Calibration Range: 20 ~ 40 °C

Function: Table 1: This equipment was connected with wet bulb probe Model: HP3201.2 S/N: 15017985. Dimension: Diameter 14 mm, Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
30	20.054	20.0	-0.1	0.099
30	25.042	25.0	0.0	0.099
30	30.030	30.0	0.0	0.099
30	35.032	35.0	0.0	0.099
30	40.013	40.0	0.0	0.099

Table 2: This equipment was connected with temperature probe Model: TP3207.2 S/N: 15015495. Dimension: Diameter 14 mm, Length 150 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
70	20.055	20.4	0.3	0.099
70	25.042	25.0	0.0	0.099
70	30.030	29.7	-0.3	0.099
70	35.031	34.6	-0.4	0.099
70	40.013	39.5	-0.5	0.099

Table 3: This equipment was connected with Globe thermometer probe Model: TP3276.2 S/N: 15015968. Dimension: Diameter 8 mm, Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
110	20.054	20.0	-0.1	0.099
110	25.043	25.0	0.0	0.099
110	30.030	30.0	0.0	0.099
110	35.031	35.0	0.0	0.099
110	40.013	40.0	0.0	0.099

UUC: Limit Under Calibration. The reported expanded uncertainty is based on standard uncertainty multiplied by a coverage factor k=2 providing a level of confidence of approximately 95%.

End of Certificate



## CERTIFICATE OF CALIBRATION

Certificate No.: CL-020-65 Page 2 of 2

Equipment Name: Heat Stress Monitor Manufacturer: DataOHM Model: H320.2 Serial No: 15000318 ID No: BNA\_F30607

Customer: Name: ALS laboratory group (Thailand) Co., Ltd. Address: 104 Phrakasarak 40, Phrakasarak Rd, Khlong San Luang, Khlong San Luang, Bangkok 10250 Thailand.

Received date: 05 Apr 2022 Calibration date: 03 May 2022 Issue date: 04 May 2022

Reference Used During Calibration: 1. Standard Temperature Probe Model: STS-100 A500, Serial No: 607802-09, Due date: 29 Mar 2023 2. Digital Temperature Indicator Model: DT-1000A M, S, Serial No: 671407-00991, Due date: 04 Jun 2022

Calibration Condition: Temperature: (23.3) °C Relative Humidity: (55.1) %

Calibration Procedure: The temperature calibration was done by in-house calibration method as WGL-001, according to comparison method with standard digital temperature indicator and standard temperature probe. The temperature scale was based on ITS-90.

Traceability: The measurement results are traceable to the international system of units (SI) through National Institute of Metrology (Thailand) (NIMT) Certificate number: TT-0034-21, Certificate number: IS-0032-21

REVIEW BY: *Phatana P.* APPROVED BY: *Phatana P.* NEXT CAL DATE: 31/6/25

Calibrated by: *Mr. Somchai Thairatid* *Mr. Jiraporn Lertsomphon*

Approved Signature: *Phatana P.* Calibration Department Manager



THIS CERTIFICATE REPORT MAY NOT BE REPRODUCED EXCEPT IN FULL UNLESS PERMISSION FOR REPRODUCTION HAS BEEN OBTAINED IN WRITING FROM THE LABORATORY.

Certificate No.: CL-020-65 Page 2 of 2

Result of Calibration: ☒ Without Adjustment ☐ With Adjustment

Calibration Range: 20 ~ 40 °C

Function: Table 1: This equipment was connected with wet bulb probe Model: HP3201.2 S/N: 15000218. Dimension: Diameter 14 mm, Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
30	20.019	20.1	0.0	0.099
30	25.067	25.1	0.0	0.099
30	30.064	30.1	0.0	0.099
30	35.066	35.0	-0.1	0.099
30	40.056	40.0	-0.1	0.099

Table 2: This equipment was connected with temperature probe Model: TP3207.2 S/N: 15003718. Dimension: Diameter 14 mm, Length 150 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
70	20.019	20.1	0.0	0.14
70	25.067	24.9	-0.2	0.14
70	30.064	29.8	-0.3	0.14
70	35.066	34.6	-0.5	0.14
70	40.056	39.5	-0.6	0.14

Table 3: This equipment was connected with Globe thermometer probe Model: TP3276.2 S/N: 15000602. Dimension: Diameter 8 mm, Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
110	20.019	20.1	0.0	0.10
110	25.067	25.1	0.0	0.10
110	30.064	30.0	0.0	0.10
110	35.066	35.0	-0.1	0.10
110	40.056	40.0	-0.1	0.10

UUC: Limit Under Calibration. The reported expanded uncertainty is based on standard uncertainty multiplied by a coverage factor k=2 providing a level of confidence of approximately 95%.

End of Certificate



THIS CERTIFICATE REPORT MAY NOT BE REPRODUCED EXCEPT IN FULL UNLESS PERMISSION FOR REPRODUCTION HAS BEEN OBTAINED IN WRITING FROM THE LABORATORY.

## CERTIFICATE OF CALIBRATION

Certificate No.: CL-120-65 Page 1 of 2

Equipment Name: Heat Stress Monitor Manufacturer: DataOHM Model: H320.2 Serial No: 150003229 ID No: BNA\_F30649

Customer: Name: ALS laboratory group (Thailand) Co., Ltd. Address: 104 Phrakasarak 40, Phrakasarak Rd, Khlong San Luang, Khlong San Luang, Bangkok 10250 Thailand.

Received date: 04 Jul 2022 Calibration date: 08 Jul 2022 Issue date: 12 Jul 2022

Reference Used During Calibration: 1. Standard Temperature Probe Model: STS-100 A500, Serial No: 607802-09, Due date: 29 Mar 2023 2. Digital Temperature Indicator Model: DT-1000A M, S, Serial No: 671407-00991, Due date: 04 Jun 2022

Calibration Condition: Temperature: (23.3) °C Relative Humidity: (55.1) %

Calibration Procedure: The temperature calibration was done by in-house calibration method as WGL-001, according to comparison method with standard digital temperature indicator and standard temperature probe. The temperature scale was based on ITS-90.

Traceability: The measurement results are traceable to the international system of units (SI) through National Institute of Metrology (Thailand) (NIMT) Certificate number: TT-0034-22, Certificate number: IS-0032-21

REVIEW BY: *Phatana P.* APPROVED BY: *Phatana P.* NEXT CAL DATE: 31/7/25

Calibrated by: *Mr. Somchai Thairatid* *Mr. Jiraporn Lertsomphon*

Approved Signature: *Phatana P.* Calibration Department Manager



THIS CERTIFICATE REPORT MAY NOT BE REPRODUCED EXCEPT IN FULL UNLESS PERMISSION FOR REPRODUCTION HAS BEEN OBTAINED IN WRITING FROM THE LABORATORY.

Certificate No.: CL-020-65 Page 2 of 2

Result of Calibration: ☒ Without Adjustment ☐ With Adjustment

Calibration Range: 20 ~ 40 °C

Function: Table 1: This equipment was connected with wet bulb probe Model: HP3201.2 S/N: 15000279. Dimension: Diameter 14 mm, Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
30	20.046	20.0	0.0	0.099
30	25.040	25.0	0.0	0.099
30	30.039	30.0	0.0	0.099
30	35.030	35.0	0.0	0.099
30	40.023	40.0	0.0	0.099

Table 2: This equipment was connected with temperature probe Model: TP3207.2 S/N: 15003279. Dimension: Diameter 14 mm, Length 150 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
70	20.046	20.2	0.2	0.099
70	25.040	25.0	0.0	0.099
70	30.039	29.8	-0.2	0.099
70	35.030	34.6	-0.4	0.099
70	40.023	39.5	-0.5	0.099

Table 3: This equipment was connected with Globe thermometer probe Model: TP3276.2 S/N: 15000035. Dimension: Diameter 8 mm, Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
110	20.046	20.1	0.1	0.099
110	25.040	25.1	0.1	0.099
110	30.039	30.1	0.1	0.099
110	35.030	35.1	0.1	0.099
110	40.023	40.1	0.1	0.099

UUC: Limit Under Calibration. The reported expanded uncertainty is based on standard uncertainty multiplied by a coverage factor k=2 providing a level of confidence of approximately 95%.

End of Certificate



## CERTIFICATE OF CALIBRATION

Certificate No.: CL-020-65 Page 1 of 2

Equipment Name: Digital thermometer with RTD Manufacturer: DataOHM Model: H312.2 Serial No: 15002240 ID No: BNA\_F30648

Customer: Name: ALS laboratory group (Thailand) Co., Ltd. Address: 104 Phrakasarak 40, Phrakasarak Rd, Khlong San Luang, Khlong San Luang, Bangkok 10250 Thailand.

Received date: 15 Mar 2022 Calibration date: 17 Mar 2022 Issue date: 18 Mar 2022

Reference Used During Calibration: 1. Standard Temperature Probe Model: STS-100 A500, Serial No: 607802-09, Due date: 29 Mar 2023 2. Digital Temperature Indicator Model: DT-1000A M, S, Serial No: 671407-00991, Due date: 04 Jun 2022

Calibration Condition: Temperature: (23.3) °C Relative Humidity: (55.1) %

Calibration Procedure: The temperature calibration was done by in-house calibration method as WGL-001, according to comparison method with standard digital temperature indicator and standard temperature probe. The temperature scale was based on ITS-90.

Traceability: The measurement results are traceable to the international system of units (SI) through National Institute of Metrology (Thailand) (NIMT) Certificate number: TT-0036-21, Certificate number: IS-0032-21

REVIEW BY: *Phatana P.* APPROVED BY: *Phatana P.* NEXT CAL DATE: 17/3/25

Calibrated by: *Mr. Somchai Thairatid* *Mr. Jiraporn Lertsomphon*

Approved Signature: *Phatana P.* Calibration Department Manager



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Certificate No.: CL-020-65 Page 2 of 2

Result of Calibration: ☒ Without Adjustment ☐ With Adjustment

Calibration Range: 20 ~ 40 °C

Function: Table 1: This equipment was connected with wet bulb probe Model: HP3201.2 S/N: 15000221. Dimension: Diameter 14 mm, Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
30	20.082	20.1	0.0	0.099
30	25.075	25.1	0.0	0.099
30	30.068	30.1	0.0	0.099
30	35.064	35.1	0.0	0.099
30	40.055	40.1	0.0	0.09





**TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)**  
**CORPORATE SERVICES & EQUIPMENT CALIBRATION AND TESTING REPORT**  
 (154/4 PETCHABURI ROAD, 10/F, BANGKOK, THAILAND) TEL: 02-25550000 FAX: 02-25550001




Certificate No.: 22011222  
 Page: 1 of 2

## Certificate of Calibration

<b>Equipment:</b> <b>Manufacturer:</b> <b>Model:</b> <b>Serial No.:</b> <b>ID No.:</b> <b>Condition As-Received:</b> <b>Received Date:</b> <b>Calibration Date:</b> <b>Reference:</b> <b>Submitted by:</b>	<b>pH Meter</b> <b>Mettler Toledo</b> <b>Seven Compact 3220</b> <b>9102046425</b> <b>INOC_FND072</b> <b>Used Item</b> <b>28 September 2022</b> <b>12 September 2022</b> <b>2209-011205C-1</b> <b>ALS Laboratory Group (Thailand) Co., Ltd.</b> 104 Muangmaekuan 60, Muangmaekuan Rd., Khwaeng Muangmaekuan, Khet Suan Luang, Bangkok 10250 Thailand <b>(25 ± 2) °C</b> <b>(22 ± 1) %</b> In - house method - CH-CH3 by direct measurement with certified voltage calibrator and direct measurement with certified reference cell (CRM)
---	--

**REVIEW BY:** *Grahk P*  
**APPROVED BY:** *CL AL*  
**NEXT-CAL DATE:** *12/09/24*

**Ambient Temperature:**  
**Relative Humidity:**  
**Calibration Procedure:**

**Calibrated by:**  
  
**Approved by:**  
☒ Meechai Sitthum  
☐ Sathira Meungman  
☐ Worawee Lengjagajana  
**Issue Date:**

**Version:** Lengjagajana  
  
  
**Approved Signature**

**15 September 2022**

**The Uncertainty are at a confidence probability of approximately 95 %**

\*This uncertainty and its expansion cover both the ISO Accredited and Non-accredited  
 Calibration of the Institute of Corporate Services & Equipment Calibration and Test Laboratory.





Cert. No.: T221644  
Page: 2 of 4

#### Condition of this calibration result

##### 1. Reference Standard Information

Instrument: Serial No. ID No. Exp. Date  
1) Document: Process Calibration: 5402049 1209C18 28/2/2023  
This calibration is traceable to the International System of Units maintained at:  
- The National Institute of Metrology (Thailand), NIMT

2) Certified Reference Materials: The measurement results are traceable to 28 through CIPM (Thailand), NIMT, and ISO-ASQ National Accreditation Board, Accredited No. AN-1635.

Buffer Solution: Manufacturer: Lot No. Exp. Date  
pH 4.008: CIPM: 623001: 26 June 2024  
pH 6.865: CIPM: 794122: 14 Feb 2023  
pH 10.001: CIPM: 623003: 20 June 2023

3. This certificate is valid only for the item measured on date and place of calibration.

#### Calibration Results

##### Function: mV Measurement

Performing standard curve by Fluke at pH (4.7, 10)

Unit Under Calibration	Nominal Value	Standard Voltage Input	Actual Reading	Uncertainty of Measurement	Coverage factor
pH Meter	4.000	0.00	0.0	0.008	2.00
SN: E02044828	7.000	0.00	0.0	0.008	2.00
	10.000	-177.48	-177.5	0.008	2.00

##### Function: pH Measurement

Performing three buffers standard curve by using buffer solution pH (4.7, 10)

Unit Under Calibration	Standard pH Buffer Solution	Actual pH Reading	Uncertainty of pH measurement (pH)	Coverage factor
pH Electrode	4.008	5.995	0.005	2.00
SN: PCE-68-EX102	6.865	7.017	0.004	2.00
	10.008	9.896	0.0078	2.00

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

-0.00-

a.1126274



Metrological Center  
SCI ECO Services Company Limited  
33/2 Moo 3, T. Banke, A. Kamphaeng, Samut Prakan 10110, Thailand  
Tel: +66 2627 5095 Fax: +66 2627 3100  
Bangkok Tel: +66 2627 5095 Fax: +66 2627 3100  
Website: www.sci-eco.com E-Mail: calibration@sci-eco.com



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: Sujar Nakkakred (Site Calibration Manager)

Approved By: Banchoi Surayang (Site Calibration Manager)

Date of Issue: 27 June 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 is in the scope 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.

TMAC/15170/2022-04

TMAC/15170/2022-04

BKK\_160017



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SCI ECO Services Company Limited  
33/2 Moo 3, T. Banke, A. Kamphaeng, Samut Prakan 10110, Thailand



Metrological Center  
SCI ECO Services Company Limited  
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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
1	2.71	2.82	2.78	2.89	2.95	3.68	3.02	3.06
2	2.71	2.72	2.73	2.74	2.75	2.76	2.77	2.78
3	2.91	3.02	2.89	3.04	2.97	3.31		

Chamber (Cold Room)	Temperature Distribution				Coverage
	Average (°C)	Stability (°C)	Uniformity (°C)	Uncertainty (°C)	
16	2.9 ± 0.1	0.1	0.02	0.02	2.00

\* The present uncertainty includes "uniformity".  
The uniformity result may vary due to the calibration method.  
The result of test was based on the data on date and place of measurement.  
The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k, which is a confidence probability of approximately 95%.

Approved By:

Approved By:

TMAC/15170/2022-04

TMAC/15170/2022-04

Summary of calibration  
This instrument was used normally and effectively, and the measurement results are traceable to the International System of Units maintained at the National Institute of Metrology (Thailand), NIMT, and ISO-ASQ National Accreditation Board, Accredited No. AN-1635.  
This instrument was used for the purpose of measurement, and the measurement results are traceable to the International System of Units maintained at the National Institute of Metrology (Thailand), NIMT, and ISO-ASQ National Accreditation Board, Accredited No. AN-1635.  
This instrument was used for the purpose of measurement, and the measurement results are traceable to the International System of Units maintained at the National Institute of Metrology (Thailand), NIMT, and ISO-ASQ National Accreditation Board, Accredited No. AN-1635.

#### Standard Equipment List

Equipment	Lot No.	Exp. Date
Standard Chamber CIPM OLYMPIA	4231	May 24
Standard Chamber CIPM OLYMPIA	4231	May 24
Signal input cable	9701010	20 Jan 23
Therm. Resistance	4143840	17 Aug 23

Test By: V131108.5  
(Miss Watsana Samartgarn)  
Service Engineer

Approved By: Banchoi Surayang  
(Mr. Banchoi Surayang)  
Position: Assistant Service Division Manager



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)  
TAP is a non-profit organization established in 1992 to promote the use of technology in Thailand and Japan.  
3401 PATTANAKARN ROAD 16, SAMUTPRAKARN 10110, THAILAND  
TEL: +66 2 627 5095 FAX: +66 2 627 3100



Cert. No.: 21TM2189  
Page: 1 of 3

### Certificate of Calibration

Equipment: HMI Air Oven

Manufacturer: Memmert

Model: UFE 500

Serial No.: Q511-1574

ID No.: BKK\_EN0207

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

Location: Oven Room

Received Order: 1 December 2021

Calibration Date: 1 December 2021

Ambient Temperature: (26 ± 1) °C

Relative Humidity: (50 ± 10) %

Calibrated by: Khl Rutanapichai

Approved by: Banchoi Surayang

( ) Porntipha Tamayakul  
( ) Maitree Suthum  
( ) Suddi Imjai

Issue Date: 7 December 2021

The Uncertainty are for a confidence probability of approximately 95%.

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Approved by the National Institute of Metrology (Thailand), NIMT, and ISO-ASQ National Accreditation Board, Accredited No. AN-1635.

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Metrological Center  
SCI ECO Services Company Limited  
33/2 Moo 3, T. Banke, A. Kamphaeng, Samut Prakan 10110, 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 result of calibration

1. This equipment was calibrated by using nine standard thermocouples type T into the chamber. The calibration was done in accordance with VIM:2011 based on ASTM E1141-14 (Reapproved 2001) and ASME:1994. All data shown below were final values and the initial data from customer request. The temperature scale used was based on ITS-90.

#### 2. Reference Standard Information

Instrument: Model: Increased No.: Certificate No.: Exp. Date:  
TC: TYPE T: TN161-TN170: T210099: 30 July 2022  
TC: TYPE T: TN171-TN190: T210099: 30 July 2022  
DATA LOGGER: 34970A: T149: T210099: 30 July 2022

3. This certificate is traceable to:  
National Institute of Metrology (Thailand) through Metrological Center (NSC-TIS-TIS T2102 CALIBRATION 0304).

#### 4. Condition of calibrated item: good

#### Equipment Description:

Time Constant: 3 Min  
Preheat Air Damp: ☐ Open ☐ Min ☐ Max ☐ Clear

Adjustment: ☐ without adjustment ☐ after adjustment

Approved By: Banchoi Surayang

#### HACH COMPANY

101 Air Base (Thailand) Limited, Building D Room No. 03 E1, 3rd Floor, No. 73/VA, Sukhvitai Road, Pattaya, Chonburi, Thailand  
Phone: +66 32 015 024 Ext. 21 Fax: +66 32 015 021 Email: hach@hach.com

LABX: 220318

#### Test Report

Customer: ALS LABORATORY GROUP (THAILAND) CO LTD	Manufacturer: -
Equipment: Climate Chamber	Model: -
Customer Model: PCE-102	Serial Number: -
Customer Serial No.: 13006220004	Serial Number: -
Date of test: 31/05/2022	Period: 1 Year
Environment: Temperature: 24.0 °C	Humidity: 50.0 %RH

#### Results

Item	Characteristic	Before	After	Remark
1	Visual Check	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail	
2	Power Supply (4.0 - 6.0 VDC)	5.7 VDC	5.8 VDC	
3	Display Error	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail	
4	Program Check	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail	
5	Function System Program	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail	

#### Warning and Error Checked

Item	Check	Before	After
6	Error Set	<input checked="" type="checkbox"/> None <input type="checkbox"/> Approx	<input checked="" type="checkbox"/> None <input type="checkbox"/> Approx

#### Check with Standard

Item	Characteristic	Before	After	Remark
7	TEMPERATURE			
8	Standard CD No. 1: 1.02 ± 0.01 mg	0.01 mg	0.01 mg	
9	Standard CD No. 2: 1.02 ± 0.01 mg	0.01 mg	0.01 mg	
10	Standard CD No. 3: 1.02 ± 0.01 mg	0.01 mg	0.01 mg	
11	Standard CD No. 4: 1.02 ± 0.01 mg	0.01 mg	0.01 mg	
12	Standard CD No. 5: 1.02 ± 0.01 mg	0.01 mg	0.01 mg	
13	Standard CD No. 6: 1.02 ± 0.01 mg	0.01 mg	0.01 mg	
14	Standard CD No. 7: 1.02 ± 0.01 mg	0.01 mg	0.01 mg	

REVIEW BY: Banchoi Surayang  
APPROVED BY: Banchoi Surayang  
NEXT CAL DATE: 31/05/2023



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TAP is a non-profit organization established in 1992 to promote the use of technology in Thailand and Japan.  
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TEL: +66 2 627 5095 FAX: +66 2 627 3100

Cert. No.: 21TM2189  
Page: 2 of 3

### Certificate of Calibration

Equipment: HMI Air Oven  
Manufacturer: Memmert  
Model: UFE 500  
Serial No.: Q511-1574  
ID No.: BKK\_EN0207

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

Location: Oven Room

Received Order: 1 December 2021

Calibration Date: 1 December 2021

Ambient Temperature: (26 ± 1) °C

Relative Humidity: (50 ± 10) %

Calibrated by: Khl Rutanapichai

Approved by: Banchoi Surayang

( ) Porntipha Tamayakul  
( ) Maitree Suthum  
( ) Suddi Imjai

Issue Date: 7 December 2021

The Uncertainty are for a confidence probability of approximately 95%.

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Approved by the National Institute of Metrology (Thailand), NIMT, and ISO-ASQ National Accreditation Board, Accredited No. AN-1635.

Approved by the National Institute of Metrology (Thailand), NIMT, and ISO-ASQ National Accreditation Board, Accredited No. AN-1635.

Approved by the National Institute of Metrology (Thailand), NIMT, and ISO-ASQ National Accreditation Board, Accredited No. AN-1635.

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Approved by the National Institute of Metrology (Thailand), NIMT, and ISO-ASQ National Accreditation Board, Accredited No. AN-1635.



Equipment : Hot Air Oven  
Condition As-Received : Used Item  
Reference : 2110-0000C-1  
Result of Calibration : ( ) Without Adjustment  
Function of UUC : Temperature Source  
Fresh air setting : Close

Cert. No.: 21TM2181  
Page: 3 of 3

Calibration Point (°C)	UUC Setting (°C)	UUC Reading (°C)	Temperature stability (°C)	Temperature uniformity (°C)	Overall Variation (°C)	Uncertainty (°C)	Coverage Factor
104.0	104.0	104.0	0.009	0.52	0.59	0.45	2
121.0	121.0	121.0	0.11	0.75	1.2	1.1	2
175.0	175.0	175.0	0.15	0.90	1.6	1.1	2
180.0	180.0	180.0	0.13	0.93	1.6	1.1	2

Calibration Point (°C)	Measured Temperature (°C)								
Position	1	2	3	4	5	6	7	8	9 (ref.)
104.0	104.265	104.229	104.080	103.922	104.360	104.304	104.284	103.994	103.909
121.0	120.808	120.519	120.561	120.524	121.162	120.855	120.703	120.726	120.726
175.0	175.051	174.603	174.543	174.652	175.830	175.521	175.411	174.440	175.222
180.0	179.792	179.374	179.375	179.376	180.843	180.081	180.174	179.217	180.014

Average : The average of 30 values in each position.  
Temperature stability : One-half of the greatest maximum difference of measured temperature at any one sensor.  
Temperature uniformity : The maximum difference of measured temperatures at any sensors and the measured temperature at the reference location, which are observed at the same time or at as close an observation time as possible to determine the temperature pattern or homogeneity within the chamber under steady-state conditions.  
Overall Variation : The difference of the maximum and minimum measured temperatures throughout observation.  
UUC : Unit Under Calibration  
Note : The reported uncertainty of measurement was included stability and excluded uniformity.  
The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor k, providing a level of confidence of approximately 95 %.

-00-

1085617

TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)  
CORPORATE SERVICES 3 : EQUIPMENT CALIBRATION AND TESTING SERVICES  
304 RATTANAKARIN ROAD (FLOOR 10), RATTANAKARIN, HUAHONG, BANGKOK 10250  
TEL: 02-171-1880 FAX: 02-279-4884

Cert. No.: 22TW122  
Page: 1 of 2

### Certificate of Testing

Equipment : DO Meter  
Manufacturer : YSI  
Model : 5000-230V  
Serial No. : 09101147  
ID No. : BKK\_EN0017  
Received Date : 20 May 2022  
Test Date : 24 May 2022  
Reference : 2205-02000C-8  
Submitted by : A.L.S. Laboratory Group (Thailand) Co., Ltd.  
104 Phatthanasak 40, Phatthanasak Rd.,  
Khwang Phatthanasak, Khwaeng Suan Luang,  
Bangkok 10250 Thailand

Laboratory Condition :  
Temperature : (25 ± 5) °C  
Humidity : (50 ± 20) %  
In-house control : 2P-Chamber  
by Comparison Technique with Azide Modification Method

Test Procedure :  
Wetland : Lungsapitkul

Tested by :  
Wetland : Lungsapitkul

Approved by :  
Approved Signature

Issue Date : 31 May 2022

1085617

Condition of this result of calibration

1. Reference Standard Instruments  
This calibration 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.	Exp. Date
1) Balance	1308110	1308110	21CO1308	20 May 2023
2) Balance	1126143784	14382004	21MAM30	21 Sep 2022

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

Result : Dissolved Oxygen Meter Adjustment With Air 100 %  
Dissolved Oxygen Probe No. : 16R100485

Titration Method (Azide Modification Method)	DO Meter Reading (mg/L)	Standard Deviation (mg/L)
6.12	0.13	0.015

This report was certified only for the instrument we tested. It is important to use for study the system efficiency. The environmental impact (control and present) in organization it may concerned limited to and for adjusting and internal purpose is permitted. This report may not be reproduced other than full written approval of the laboratory.

1110482

TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)  
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304 RATTANAKARIN ROAD (FLOOR 10), RATTANAKARIN, HUAHONG, BANGKOK 10250  
TEL: 02-171-1880 FAX: 02-279-4884

Cert. No.: 22LMB1  
Page: 1 of 2

### Certificate of Calibration

Equipment : DO Meter with Sensor  
Manufacturer : YSI  
Model : 5000-230V  
Serial No. : 09101147  
ID No. : BKK\_EN0017  
Submitted by : A.L.S. Laboratory Group (Thailand) Co., Ltd.  
104 Phatthanasak 40, Phatthanasak Rd.,  
Khwang Phatthanasak, Khwaeng Suan Luang,  
Bangkok 10250 Thailand

Location : TPA On Site Calibration Laboratory

Received Order : 20 May 2022  
Calibrated Date : 30 May 2022  
Ambient Temperature : (26 ± 10) °C  
Relative Humidity : (30 ± 30) %  
AC Line Voltage : (220 ± 12) V  
Calibrated by : Tawatchai Thana

Approved by :  
Approved Signature

Issue Date : 31 May 2022

The uncertainty is for a confidence probability of approximately 95 %.  
This calibration was performed using a standard uncertainty multiplied by a coverage factor k, providing a level of confidence of approximately 95 %.

003957

TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)  
CORPORATE SERVICES 3 : EQUIPMENT CALIBRATION AND TESTING SERVICES  
304 RATTANAKARIN ROAD (FLOOR 10), RATTANAKARIN, HUAHONG, BANGKOK 10250  
TEL: 02-171-1880 FAX: 02-279-4884

Cert. No.: 22LMB1  
Page: 2 of 2

Procedure Used :  
Calibration was conducted using in-house calibration procedure CP-0101 according to comparison with Industrial Platinum Resistance Thermometer 1 (IPRT) in Water Temperature Bath.  
The temperature scale used was based on ITS-90.

Condition of this result of calibration

1. Reference standard instrument:  
Instrument : Digital Thermometer  
Model : 1032A  
Serial No. : A0004  
Exp. Date : 04 Jan 2023

2. This certificate is valid only in this item calibration 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 transmitter sensor (ID No.: 16R100485)

Calibration Point (°C)	Immersion Depth (mm)	Standard Temperature (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)	Coverage Factor
25.00	60	25.003	25.01	-0.007	0.05	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 %.

-00-

1030806

Metrological Center  
SCI ECO Services Company Limited  
332 Moo 3, T.Bangpa, A.Kaengkhro, Saraburi 18110, Thailand  
Saraburi Tel : +66 3627 3096 Fax : +66 3627 3100  
Bangkok Tel : +66 5205 9851, +66 8247 2360  
Website : www.sci-eco.co.th E-Mail : calibrate@sci-eco.co.th

Cert. No.: T212123  
Page: 1 of 3

### Certificate of Calibration

Equipment : Chamber (Incubator)  
Manufacturer : SHEL LAB  
Model : 2020-2E  
Serial No. : 802899  
Customer Code : BKK\_EN0005  
ID No. : T7499A0  
Customer : A.L.S. Laboratory Group (Thailand) Co., Ltd.  
104 Phatthanasak 40, Phatthanasak Rd., Khwang Phatthanasak,  
Khet Suan Luang, Bangkok 10250

Customer Location : Wet Chemistry Lab2  
Date of Receipt : 1 October 2021  
Calibrated By : Sujjar Nakanakred (Site Calibration Manager)  
Approved By : Sujjar Nakanakred (Site Calibration Manager)  
Date of Issue : 07 OCT 2021

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.

1030806

SCG Metrological Center  
SCI ECO Services Company Limited  
332 Moo 3, T.Bangpa, A.Kaengkhro, Saraburi 18110, Thailand

Cert. No.: T212123  
Page: 2 of 3

### Calibration Report

Equipment : Chamber (Incubator)  
Date of Calibration : 4-5 October 2021  
Environment :  
Temperature : 23.8-24.9 °C  
Line Voltage : 227.5-231.1 V  
Relative Humidity : 55-65 %RH

Condition of this result of calibration :  
1. This equipment was calibrated by insert size resistance thermometer detectors into its chamber, the other out resistance thermometer detectors were for ambient temperature measurement. The calibration was done in accordance with ISO 17025 (based on ASTM E1134-01 (Reapproved 2001) and ASTM E1135-10).  
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 : 25-CRH-10  
Instrument No. : 7210118  
Certificate No. : 7210118  
Exp. Date : 2 February 2022  
3. This certificate is traceable to :  
National Institute of Metrology (Thailand) through Metrological Center (NIST-TS/ITS-90/15 CALIBRATION 0244).  
4. Condition of calibrated item : good  
Equipment Description :  
Flow Controller : 2 Hour 20 Minute At 20 °C  
Fresh Air Dampers : ☐ Open ☐ Min ☐ Medium ☐ Max  
☒ Close ☐ Not Available  
5. Adjustment :  
( ) without adjustment (X) after adjustment

Approved By :

1085617

SCG Metrological Center  
SCI ECO Services Company Limited  
332 Moo 3, T.Bangpa, A.Kaengkhro, Saraburi 18110, Thailand

Cert. No.: T212123  
Page: 3 of 3

### Calibration Report

Remark :  
Internal Dimensions of Chamber : W (Width) = 79 cm, H (Height) = 131 cm and D (Depth) = 59 cm.  
Step of Inserted Standard sensor number 25-CRH1 to number 25-CRH1 : 0.1 cm, 3-5 cm, and 0.1 cm.  
Step of Inserted Standard sensor number 25-CRH2 to 25-CRH2 : 0.1 cm, 3-5 cm, and 0.1 cm.

Measurement Results

Calibration Point	Average Standard Reading at each position (°C)							
	25-CRH1	25-CRH2	25-CRH3	25-CRH4	25-CRH5	25-CRH6	25-CRH7	25-CRH8
20	20.04	20.08	20.19	19.86	19.68	20.08	20.12	19.80
25	24.99	25.06	25.18	24.89	24.74	25.12	25.06	25.18

Setting (°C)	Chamber (Incubator)			Temperature Distribution			Coverage Factor k
	Min	Max	Average	Stability (°C)	Uniformity (°C)	Uncertainty (°C)	
20.0	—	20.0	—	0.05	0.05	0.38	2.00
25.0	—	25.0	—	0.07	0.06	0.34	2.00

\* The speed uncertainty exceeds "tolerability".  
The tolerance level only apply only for these calibrated items.  
The result of test was final values 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 k-distribution, providing a level of confidence of approximately 95 %.

Approved By :

1085617

SCG Metrological Center  
SCI ECO Services Company Limited  
332 Moo 3, T.Bangpa, A.Kaengkhro, Saraburi 18110, Thailand  
Saraburi Tel : +66 3627 3096 Fax : +66 3627 3100  
Bangkok Tel : +66 5205 9851, +66 8247 2360  
Website : www.sci-eco.co.th E-Mail : calibrate@sci-eco.co.th

Cert. No.: T22636  
Page: 1 of 5

### Certificate of Calibration

Equipment : HIOT BLOCK  
Manufacturer : Environmental Express  
Model : B3000-240  
Serial No. : 2017COW116  
Customer Code : BKK\_EN0222  
ID No. : T6769A4  
Customer : A.L.S. Laboratory Group (Thailand) Co., Ltd.  
104 Phatthanasak 40, Phatthanasak Rd., Khwang Phatthanasak,  
Khet Suan Luang, Bangkok 10250

Customer Location : Wet Chemistry Lab2  
Date of Receipt : 21 March 2022  
Calibrated By : Watcharapong Sangtong (Technician)  
Approved By : Sujjar Nakanakred (Site Calibration Manager)  
Date of Issue : 01 APR 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.

1030806



Certificate No. T220638 Page 2 of 5

### Calibration Report

Equipment : 1. HOT BLOCK  
Date of Calibration : 21 March 2022  
Environment : 1. Temperature : 23.8-24.1 °C  
2. Line Voltage : 221.6-226.3 V  
Relative Humidity : 55-65 %RH

#### Condition of this results of calibration :

- This equipment was calibrated by insert class standard thermocouple type T into its chamber, (the other one standard thermocouple type T was for ambient temperature measurement). The calibration was done in accordance to NIST-720.
- All data shown below were final values and the initial data from customer request. The temporary scale used was based on ITS-90.
- Reference Standard Instrument :  
Instrument Model Instrument No. Certificate No. Due Date  
TC TYPE T TNS1-TN60 T220275 28 February 2022  
DATA LOGGER 3497NA TNS1-TN70 T220275 28 February 2022
- This certificate is suitable for :  
National Institute of Metrology (Thailand) through Metrological Center (NIST-ITS 17025 CALIBRATION BSL)
- Condition of calibrated item : good  
Equipment Description :  
Time Constant : 1 User - Minute At 150 °C  
Frost Air Damper : ☐ Open ☒ Min ☐ Medium ☐ Max  
Cool : ☐ On ☒ Off  
Not Available : ☒ Not Available
- Adjustment :  
( ) without adjustment (X) after adjustment

Approved By: [Signature]

FILE:11300305-37

Certificate No. T220638 Page 3 of 5

### Calibration Report

RT	(40)	(60)	(80)	(100)	(120)	(140)	(160)	(180)	(200)
R1	(40)	(60)	(80)	(100)	(120)	(140)	(160)	(180)	(200)
R2	(40)	(60)	(80)	(100)	(120)	(140)	(160)	(180)	(200)
R3	(40)	(60)	(80)	(100)	(120)	(140)	(160)	(180)	(200)
R4	(40)	(60)	(80)	(100)	(120)	(140)	(160)	(180)	(200)
R5	(40)	(60)	(80)	(100)	(120)	(140)	(160)	(180)	(200)
R6	(40)	(60)	(80)	(100)	(120)	(140)	(160)	(180)	(200)
R7	(40)	(60)	(80)	(100)	(120)	(140)	(160)	(180)	(200)
R8	(40)	(60)	(80)	(100)	(120)	(140)	(160)	(180)	(200)
R9	(40)	(60)	(80)	(100)	(120)	(140)	(160)	(180)	(200)
R10	(40)	(60)	(80)	(100)	(120)	(140)	(160)	(180)	(200)

#### STANDARD THERMOCOUPLE TYPE T

See 1	See 2	See 3	See 4	See 5	See 6	See 7	See 8	See 9	See 10
See 1	See 2	See 3	See 4	See 5	See 6	See 7	See 8	See 9	See 10
See 1	See 2	See 3	See 4	See 5	See 6	See 7	See 8	See 9	See 10
See 1	See 2	See 3	See 4	See 5	See 6	See 7	See 8	See 9	See 10
See 1	See 2	See 3	See 4	See 5	See 6	See 7	See 8	See 9	See 10
See 1	See 2	See 3	See 4	See 5	See 6	See 7	See 8	See 9	See 10
See 1	See 2	See 3	See 4	See 5	See 6	See 7	See 8	See 9	See 10
See 1	See 2	See 3	See 4	See 5	See 6	See 7	See 8	See 9	See 10
See 1	See 2	See 3	See 4	See 5	See 6	See 7	See 8	See 9	See 10
See 1	See 2	See 3	See 4	See 5	See 6	See 7	See 8	See 9	See 10

Approved By: [Signature]

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Certificate No. T220638 Page 4 of 5

### Calibration Report

Measurement Results										
Calibration Point		Average Standard Reading at each position (°C)								
CAL POINT 100	R1	TN51	TN52	TN53	TN54	TN55	TN56	TN57	TN58	TN59
	Min	109.42	109.23	109.23	109.23	109.23	109.23	109.23	109.23	109.23
	Max	107.27	107.18	107.18	107.18	107.18	107.18	107.18	107.18	107.18
	Average	108.35	108.27	108.21	108.21	108.21	108.21	108.21	108.21	108.21
	Stdev	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43
R2	Min	106.50	106.45	106.45	106.45	106.45	106.45	106.45	106.45	106.45
	Max	104.86	104.78	104.78	104.78	104.78	104.78	104.78	104.78	104.78
	Average	105.68	105.61	105.61	105.61	105.61	105.61	105.61	105.61	105.61
	Stdev	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40
	Range	1.64	1.67	1.67	1.67	1.67	1.67	1.67	1.67	1.67
R3	Min	105.60	105.51	105.51	105.51	105.51	105.51	105.51	105.51	105.51
	Max	103.94	103.86	103.86	103.86	103.86	103.86	103.86	103.86	103.86
	Average	104.77	104.69	104.69	104.69	104.69	104.69	104.69	104.69	104.69
	Stdev	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39
	Range	1.66	1.65	1.65	1.65	1.65	1.65	1.65	1.65	1.65
R4	Min	104.50	104.41	104.41	104.41	104.41	104.41	104.41	104.41	104.41
	Max	102.84	102.76	102.76	102.76	102.76	102.76	102.76	102.76	102.76
	Average	103.67	103.59	103.59	103.59	103.59	103.59	103.59	103.59	103.59
	Stdev	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37
	Range	1.66	1.63	1.63	1.63	1.63	1.63	1.63	1.63	1.63
R5	Min	103.50	103.41	103.41	103.41	103.41	103.41	103.41	103.41	103.41
	Max	101.84	101.76	101.76	101.76	101.76	101.76	101.76	101.76	101.76
	Average	102.67	102.59	102.59	102.59	102.59	102.59	102.59	102.59	102.59
	Stdev	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36
	Range	1.66	1.63	1.63	1.63	1.63	1.63	1.63	1.63	1.63
R6	Min	102.50	102.41	102.41	102.41	102.41	102.41	102.41	102.41	102.41
	Max	100.84	100.76	100.76	100.76	100.76	100.76	100.76	100.76	100.76
	Average	101.67	101.59	101.59	101.59	101.59	101.59	101.59	101.59	101.59
	Stdev	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35
	Range	1.66	1.63	1.63	1.63	1.63	1.63	1.63	1.63	1.63
R7	Min	101.50	101.41	101.41	101.41	101.41	101.41	101.41	101.41	101.41
	Max	99.84	99.76	99.76	99.76	99.76	99.76	99.76	99.76	99.76
	Average	100.67	100.59	100.59	100.59	100.59	100.59	100.59	100.59	100.59
	Stdev	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34
	Range	1.66	1.63	1.63	1.63	1.63	1.63	1.63	1.63	1.63

Approved By: [Signature]

FILE:11300305-37

Certificate No. T220638 Page 5 of 5

### Calibration Report

#### Measurement Results:

HOT BLOCK			Temperature Distribution:	
Soaking (°C)	Reading (°C)		Stability (± °C)	Uncertainty (± °C)
	Min, Max	Average		
150.0	149.9, 150.1	150.0	1.04	1.68

\* The quoted accuracy value is "confidence".  
The calibration result applies only to the items calibrated here.  
The result of test was based on the data at the time of test only.  
The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k = 2 (about 95% confidence probability).  
A level of confidence of approximately 95%.

Approved By: [Signature]

FILE:11300305-37

Certificate of Calibration  
BSCC-UV-30722  
UV-Vis Spectrophotometer  
Model: UV-1800  
Serial No.: A1143408032C3  
ID No.: 9892-00018  
Date of receipt: 16 September 2022  
Date of calibration: 16 September 2022  
Date of issue: 23 September 2022  
Customer name: A/S Laboratory Design (Thailand) Co., Ltd.  
Address: 101 So Phatthanasak 40, Phatthanasak Road, Phatthanasak, Sam Luang, Bangkok 10250  
Temperature: 22.1-23.1 °C (Dry box)  
Humidity: 58.4-63.2 %RH (Dry box)  
Equipment condition: Good Operation  
Calibration Location: Organic Unit  
Calibration Procedure: Wavelength: 190-900 nm, Wavelength: 190-900 nm based on ASTM E275-01  
Uncertainty: Wavelength Accuracy is traceable to certificate No. 09897 and 09898  
Photometric Accuracy is traceable to certificate No. 09892 and 09893  
Spectral Light is traceable to certificate No. 09894  
The above certificates are traceable to SI units through National Institute of Standards and Technology (NIST) (UKAS accredited calibration laboratory No. 9668)  
Calibrated by: M. Watanabe, Laboratory  
Approved by: [Signature]  
Mr. Sittichai Chongkarn  
Technical Manager

FILE:11300305-37

Certificate of Calibration  
BSCC-UV-30722  
UV-Vis Spectrophotometer  
Model: UV-1800  
Serial No.: A1143408032C3  
ID No.: 9892-00018  
Date of receipt: 16 September 2022  
Date of calibration: 16 September 2022  
Date of issue: 23 September 2022  
Customer name: A/S Laboratory Design (Thailand) Co., Ltd.  
Address: 101 So Phatthanasak 40, Phatthanasak Road, Phatthanasak, Sam Luang, Bangkok 10250  
Temperature: 22.1-23.1 °C (Dry box)  
Humidity: 58.4-63.2 %RH (Dry box)  
Equipment condition: Good Operation  
Calibration Location: Organic Unit  
Calibration Procedure: Wavelength: 190-900 nm, Wavelength: 190-900 nm based on ASTM E275-01  
Uncertainty: Wavelength Accuracy is traceable to certificate No. 09897 and 09898  
Photometric Accuracy is traceable to certificate No. 09892 and 09893  
Spectral Light is traceable to certificate No. 09894  
The above certificates are traceable to SI units through National Institute of Standards and Technology (NIST) (UKAS accredited calibration laboratory No. 9668)  
Calibrated by: M. Watanabe, Laboratory  
Approved by: [Signature]  
Mr. Sittichai Chongkarn  
Technical Manager

FILE:11300305-37

Certificate of Calibration  
BSCC-UV-30722  
UV-Vis Spectrophotometer  
Model: UV-1800  
Serial No.: A1143408032C3  
ID No.: 9892-00018  
Date of receipt: 16 September 2022  
Date of calibration: 16 September 2022  
Date of issue: 23 September 2022  
Customer name: A/S Laboratory Design (Thailand) Co., Ltd.  
Address: 101 So Phatthanasak 40, Phatthanasak Road, Phatthanasak, Sam Luang, Bangkok 10250  
Temperature: 22.1-23.1 °C (Dry box)  
Humidity: 58.4-63.2 %RH (Dry box)  
Equipment condition: Good Operation  
Calibration Location: Organic Unit  
Calibration Procedure: Wavelength: 190-900 nm, Wavelength: 190-900 nm based on ASTM E275-01  
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Calibrated by: M. Watanabe, Laboratory  
Approved by: [Signature]  
Mr. Sittichai Chongkarn  
Technical Manager

FILE:11300305-37

Certificate of Calibration  
BSCC-UV-30722  
UV-Vis Spectrophotometer  
Model: UV-1800  
Serial No.: A1143408032C3  
ID No.: 9892-00018  
Date of receipt: 16 September 2022  
Date of calibration: 16 September 2022  
Date of issue: 23 September 2022  
Customer name: A/S Laboratory Design (Thailand) Co., Ltd.  
Address: 101 So Phatthanasak 40, Phatthanasak Road, Phatthanasak, Sam Luang, Bangkok 10250  
Temperature: 22.1-23.1 °C (Dry box)  
Humidity: 58.4-63.2 %RH (Dry box)  
Equipment condition: Good Operation  
Calibration Location: Organic Unit  
Calibration Procedure: Wavelength: 190-900 nm, Wavelength: 190-900 nm based on ASTM E275-01  
Uncertainty: Wavelength Accuracy is traceable to certificate No. 09897 and 09898  
Photometric Accuracy is traceable to certificate No. 09892 and 09893  
Spectral Light is traceable to certificate No. 09894  
The above certificates are traceable to SI units through National Institute of Standards and Technology (NIST) (UKAS accredited calibration laboratory No. 9668)  
Calibrated by: M. Watanabe, Laboratory  
Approved by: [Signature]  
Mr. Sittichai Chongkarn  
Technical Manager

FILE:11300305-37

Certificate of Calibration  
BSCC-UV-30722  
UV-Vis Spectrophotometer  
Model: UV-1800  
Serial No.: A1143408032C3  
ID No.: 9892-00018  
Date of receipt: 16 September 2022  
Date of calibration: 16 September 2022  
Date of issue: 23 September 2022  
Customer name: A/S Laboratory Design (Thailand) Co., Ltd.  
Address: 101 So Phatthanasak 40, Phatthanasak Road, Phatthanasak, Sam Luang, Bangkok 10250  
Temperature: 22.1-23.1 °C (Dry box)  
Humidity: 58.4-63.2 %RH (Dry box)  
Equipment condition: Good Operation  
Calibration Location: Organic Unit  
Calibration Procedure: Wavelength: 190-900 nm, Wavelength: 190-900 nm based on ASTM E275-01  
Uncertainty: Wavelength Accuracy is traceable to certificate No. 09897 and 09898  
Photometric Accuracy is traceable to certificate No. 09892 and 09893  
Spectral Light is traceable to certificate No. 09894  
The above certificates are traceable to SI units through National Institute of Standards and Technology (NIST) (UKAS accredited calibration laboratory No. 9668)  
Calibrated by: M. Watanabe, Laboratory  
Approved by: [Signature]  
Mr. Sittichai Chongkarn  
Technical Manager

FILE:11300305-37



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)  
CORPORATE SERVICES & EQUIPMENT CALIBRATION AND TESTING SERVICES  
1344 PATTANAKARN ROAD (Rt. 9), SUANLUANG, BANGKOK 10250  
TEL: 0-2279-3883 FAX: 0-2279-3884

Cert. No.: 22LM142  
Page: 2 of 2

### Certificate of Calibration

Equipment: pH Meter with Sensor  
Manufacturer: Mettler Toledo  
Model: SevenGo pH  
Serial No.: C11762092  
ID No.: BOK\_LG0044  
Submitted by: ALS Laboratory Group (Thailand) Co., Ltd.  
104 Phrathanakarn Rd., Phrathanakarn Rd.,  
Khwang Phrathanakarn, Khet Suan Luang,  
Bangkok 10250 Thailand  
Location: Chemistry Calibration Lab.2  
Received Order: 30 September 2022  
Calibrated Date: 4 October 2022  
Ambient Temperature: (26 ± 1) °C  
Relative Humidity: (50 ± 30) %  
AC Line Voltage: (220 ± 22) V  
Calibrated by: Warakorn Lenggrasakul  
Approved by: Approved Signatory  
( ) Pongthippa Tameyakul  
( ) Malee Bulnuwe  
( ) Suwit Injai  
Issue Date: 6 October 2022

The Uncertainty is for a confidence probability of approximately 95 %  
This certificate may only be reproduced either in full, or with the prior written  
approval of the Board of Corporate Services & Equipment Calibration and Testing Services.

A 0046082

TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)  
CORPORATE SERVICES & EQUIPMENT CALIBRATION AND TESTING SERVICES  
1344 PATTANAKARN ROAD (Rt. 9), SUANLUANG, BANGKOK 10250  
TEL: 0-2279-3883 FAX: 0-2279-3884

Cert. No.: 22LM142  
Page: 2 of 2

### Certificate of Calibration

Equipment: pH Meter with Sensor  
Condition As-Received: Used Item  
Reference: 2209-1011DSC-4  
Procedure Used: 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 22049 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: (°C) Without Adjustment  
Function: Temperature measurement  
This instrument was connected with temperature sensor, SN: 2345425  
Calibration Point Immersion Depth Standard Temperature Reading Error Uncertainty Coverage Factor  
(°C) (mm) (°C) (°C) (°C) (± °C) %  
20.0 110 20.003 19.9 -0.103 0.16 2.00  
25.0 110 25.002 24.9 -0.102 0.16 2.00  
30.0 110 30.004 30.0 -0.004 0.19 2.00  
35.0 110 35.005 35.0 -0.005 0.16 2.00  
40.0 110 40.003 40.0 -0.003 0.19 2.00  
45.0 110 45.003 45.0 -0.003 0.19 2.00  
50.0 110 50.002 50.0 -0.002 0.19 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 %.

B 1129888

TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)  
CORPORATE SERVICES & EQUIPMENT CALIBRATION AND TESTING SERVICES  
1344 PATTANAKARN ROAD (Rt. 9), SUANLUANG, BANGKOK 10250  
TEL: 0-2279-3883 FAX: 0-2279-3884

Cert. No.: 22TM121  
Page: 1 of 2

### Certificate of Testing

Equipment: DO Meter  
Manufacturer: Mettler Toledo  
Model: SevenGo Pro 58  
Serial No.: B915498158  
ID No.: BOK\_LG0038  
Received Date: 20 May 2022  
Test Date: 24 May 2022  
Reference: 2205-0638DSC-6  
Submitted by: ALS Laboratory Group (Thailand) Co., Ltd.  
104 Phrathanakarn Rd., Phrathanakarn Rd.,  
Khwang Phrathanakarn, Khet Suan Luang,  
Bangkok 10250 Thailand  
Laboratory Condition: Temperature (25 ± 5) °C  
Humidity (50 ± 20) %  
Test Procedure: In-house method CH-019  
By Comparison Technique with Acid Modification Method  
Tested by: Warakorn Lenggrasakul  
Approved by: Approved Signatory  
( ) Malee Bulnuwe  
( ) Baphip Meangma  
( ) Warakorn Lenggrasakul  
Issue Date: 30 May 2022

B 0288922

TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)  
CORPORATE SERVICES & EQUIPMENT CALIBRATION AND TESTING SERVICES  
1344 PATTANAKARN ROAD (Rt. 9), SUANLUANG, BANGKOK 10250  
TEL: 0-2279-3883 FAX: 0-2279-3884

Cert. No.: 22TM121  
Page: 2 of 2

### Certificate of Calibration

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 1308010 21C01389 25 Mar 2023  
2) Balance 1126143784 143RC004 21MM430 21 Sep 2022  
2. Standard Material:  
Material Manufacturer Lot No. Assay  
Sodium Thiosulfate pentahydrate March AM1753316 100.2%  
Result: Dissolved Oxygen Meter Adjustment With Air 100 %  
Dissolved Oxygen Probe No.: 50741  
Titration Method (Azide Modification Method) DO Meter Reading Standard Deviation (mg/L) (mg/L) (mg/L)  
8.12 8.18 0.014  
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 either in full without written approval of the laboratory.

A 1110481

TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)  
CORPORATE SERVICES & EQUIPMENT CALIBRATION AND TESTING SERVICES  
1344 PATTANAKARN ROAD (Rt. 9), SUANLUANG, BANGKOK 10250  
TEL: 0-2279-3883 FAX: 0-2279-3884

Cert. No.: 22LM182  
Page: 1 of 2

### Certificate of Calibration

Equipment: DO Meter with Sensor  
Manufacturer: Mettler Toledo  
Model: SevenGo Pro 58  
Serial No.: B915498158  
ID No.: BOK\_LG0038  
Submitted by: ALS Laboratory Group (Thailand) Co., Ltd.  
104 Phrathanakarn Rd., Phrathanakarn Rd.,  
Khwang Phrathanakarn, Khet Suan Luang,  
Bangkok 10250 Thailand  
Location: TPA On Site Calibration Laboratory  
Received Order: 20 May 2022  
Calibrated Date: 30 May 2022  
Ambient Temperature: (26 ± 1) °C  
Relative Humidity: (50 ± 30) %  
AC Line Voltage: (220 ± 22) V  
Calibrated by: Tawatchai Plank  
Approved by: Approved Signatory  
( ) Pongthippa Tameyakul  
( ) Malee Bulnuwe  
( ) Suwit Injai  
Issue Date: 31 May 2022

The Uncertainty is for a confidence probability of approximately 95 %  
This certificate may only be reproduced either in full, or with the prior written  
approval of the Board of Corporate Services & Equipment Calibration and Testing Services.

A 0041781

TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)  
CORPORATE SERVICES & EQUIPMENT CALIBRATION AND TESTING SERVICES  
1344 PATTANAKARN ROAD (Rt. 9), SUANLUANG, BANGKOK 10250  
TEL: 0-2279-3883 FAX: 0-2279-3884

Cert. No.: 22LM182  
Page: 2 of 2

### Certificate of Calibration

Equipment: DO Meter with Sensor  
Condition As-Received: Used Item  
Reference: 2205-0638DSC-6  
Procedure Used: 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 1502A A06004 2208 04 Jan 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: (°C) Without Adjustment  
Function: Temperature measurement  
This instrument was connected with temperature sensor, SN: 839070  
Calibration Point Immersion Depth Standard Temperature Reading Error Uncertainty Coverage Factor (°C) (mm) (°C) (°C) (°C) (± °C) %  
20.0 60 19.996 20.2 0.204 0.16 2.00  
UUC: Unit Under Calibration  
The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor k, providing a level of confidence of approximately 95 %.

A 1110674

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Agilent CrossLab Compliance Services

### EQUIPMENT QUALIFICATION REPORT (EQR)

Agilent CrossLab Compliance

Qualification Type: ICPMS-QQ  
System ID: JP15471168  
EOP Name: AgilentRecommended  
EOP Revision: ICPMS 02.50  
EOP Publish Date: March 2020  
Date: September 30, 2021 4:07:18 PM  
Report Type: Report  
Org. Name: ALS Laboratory Group (Thailand) Co., Ltd.  
Org. Location: 104 Phrathanakarn Rd., Suan Luang, Bangkok 10250.

REVIEW BY:   
APPROVED BY:   
NEXT CAL DATE: 29 March 2023

Date: September 30, 2021 4:07:18 PM  
System ID: JP15471168  
Page: 1 / 34

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Agilent CrossLab Compliance Services

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Date: September 30, 2021 4:07:18 PM  
System ID: JP15471168  
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Agilent CrossLab Compliance Services

### Test Summary

Purpose:  
This section includes a check for each test included test and the overall qualification. For each test that is not (1) the status is automatically determined based on (pre-defined) tests, and (2) the test number of times the test was not displayed. For qualified results and specifications for a test, refer to the test results in this EQR.

Test	Status	Pass
Autosampler Check: SP54	Pass	1
Integrated Sample Introduction System (ISIS) Check: 0863	Pass	1
Autobore: 0863A	Pass	1
Background (No Gas Mode): 0845A	Pass	1
Background (Gas Mode): 0845A	Pass	1
20-Minute Stability (No Gas Mode): 0845A	Pass	1

Overall Qualification Status:  
Pass

Date: September 30, 2021 4:07:18 PM  
System ID: JP15471168  
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## Service Details

**Purpose**  
This section includes basic details and details related to this service.

<b>General Details</b>	
Service Order No. (SOW#)	SOW456789
SOP Name	AgilentServiceAgilent
SOP Revision	02/01/2021
Report Type	Report
<b>Organization Details</b>	
Name	ABC Laboratory Group (Thailand) Co., Ltd.
Location	34 Phibunsongkro Rd., Suan Luang, Bangkok 10250
<b>Local Contact Details</b>	
Name	Chutima Kongsakul
Job Title	Manager
Qualification Location	Laboratory
<b>Operator Details</b>	
Name	Pattana Kongsakul
Job Title	First Service Engineer
<b>Key Acquisition Details</b>	
Acquisition Software Name	MassHunter
Acquisition Software Revision	C.01.04
Customer Case Number (CCN)	SYSTEM456789

Date: September 30, 2021 4:07:18 PM  
System ID: J15471189

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## Calculation Formulas

**Purpose**  
This section includes calculation formulas for all testable tests. Depending upon which tests are performed, all or some apply to your configuration.

For a description of calculations for ICP-MS tests performed by the MassHunter software, refer to the MassHunter application pdf documentation.

Date: September 30, 2021 4:07:18 PM  
System ID: J15471189

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## Integrated Sample Introduction System (ISIS) Check

**Purpose**  
This test demonstrates that the ISIS system is correctly installed and operational. It does not test module performance.

<b>Setup</b>	
<b>Results</b>	
<b>Criteria</b>	
As recommended, does the pump prime?	Yes
As recommended, do the valves leak and repeat?	Yes
Setup Status:	Pass
Overall Integrated Sample Introduction System (ISIS) Check Test Status:	Pass

Date: September 30, 2021 4:07:18 PM  
System ID: J15471189

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## Instrument Details

**Purpose**  
This section describes this as front system configuration.

<b>ICP-MS 1</b>	
Manufacturer	Agilent Technologies
Name	7500
Model Number	08403A
Instrument Config	RF009 Standard Package with hydrogen option
Detector Type	SI
Neptune	New Mod (2014/1)
Sample Chiller	Quartz
Trap	Quartz
Sampling Cone	76
Spray Chamber	76
Serial Number	J15471189
Front Panel	C31.04
<b>MS 1</b>	
Manufacturer	Agilent Technologies
Name	7693
Model Number	08411A
Type	Parallel pump system
Serial Number	J15510221
<b>Autotune 1</b>	
Manufacturer	Agilent Technologies
Name	SPSA
Model Number	08410A
Serial Number	AU1540972

Date: September 30, 2021 4:07:18 PM  
System ID: J15471189

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## Protocol Details

**Purpose**  
This section lists the revisions for all test steps used in this report. For maximum test details and high-level change details, refer to the Revision History document.

Test Revision	Type
ICPMS.02.00	20-Minute Stability (No Gas Mode)
ICPMS.02.00	Autosampler Check
ICPMS.02.00	Autotune
ICPMS.02.00	Blank (No Gas Mode)
ICPMS.02.00	Blank (No Gas Mode)
ICPMS.02.00	Integration Sample Introduction System (ISIS) Check

Date: September 30, 2021 4:07:18 PM  
System ID: J15471189

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## Autotune

**Purpose**  
This test uses traceable checked standards to run a software-enclosed autotune in all modes. The test report provides values for peak width, mass rate, sensitivity, stable species, and doubly-charged species tests.

<b>Setup</b>	
<b>Results</b>	
<b>Criteria</b>	
As recommended, does the pump prime?	Yes
As recommended, do the valves leak and repeat?	Yes
Setup Status:	Pass
Overall Autotune Test Status:	Pass

Date: September 30, 2021 4:07:18 PM  
System ID: J15471189

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## Utility 1

Manufacturer	Agilent Technologies
Name	Cross
Model Number	02000A
Serial Number	01101010

Date: September 30, 2021 4:07:18 PM  
System ID: J15471189

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## Autosampler Check

**Purpose**  
This test demonstrates that the autosampler module is correctly installed and operational. It does not test module performance.

<b>Setup</b>	
<b>Results</b>	
<b>Criteria</b>	
After the test, is the probe in the home position?	Yes
As recommended, is the probe positioned as set?	Yes
Setup Status:	Pass
Overall Autosampler Check Test Status:	Pass

Date: September 30, 2021 4:07:18 PM  
System ID: J15471189

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<b>Setup</b>	
<b>Results</b>	
<b>Criteria</b>	
Mass 7 Sensitivity No Gas	24.38
Agilent Recommended:	25.5
Status:	Pass
Mass 8 Sensitivity No Gas	207.15
Agilent Recommended:	127.5
Status:	Pass
Mass 205 Sensitivity No Gas	203.77
Agilent Recommended:	76.5
Status:	Pass
Mass 59 Sensitivity H <sub>2</sub>	28.38
Agilent Recommended:	23.8
Status:	Pass
Mass 89 Sensitivity H <sub>2</sub>	129.27
Agilent Recommended:	68
Status:	Pass
Daily Rate 155/140	1.847
Agilent Recommended:	1.58
Status:	Pass
Doubly Charged Species Ratio 70/140	1.482
Agilent Recommended:	2.3
Status:	Pass
Setup Status:	Pass
Overall Autotune Test Status:	Pass

Date: September 30, 2021 4:07:18 PM  
System ID: J15471189

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## 100-4418

[illegible]

		<h2 style="text-align: center;">Metrological Center</h2> <h3 style="text-align: center;">SCI ECO Services Company Limited</h3>	
33/2 Moo 3, T.Bamoa, A.Kongkijai, Saraburi 18115 Telephone : +66 2 596 5792-4 Fax : +66 2 596 5199 Website : www.sceco.co.th E-Mail : calibrate@scg.co.th			
Certificate No. T220730			
<h2>Certificate of Calibration</h2>			
Equipment	:	HEATING BLOCK	
Manufacturer	:	Environmental Express	
Model	:	SC 196	
Serial No.	:	6974CECW3285	
Customer Code	:	BKK_EI_0054	
ID No.	:	T5306A3	
Customer	:	ALS Laboratory Group (Thailand) Co.,Ltd.	
164 Phathanakun 40, Phathanakun Rd., Kaweng Phathanakun, Khet Suan Luang, Bangkok 10250			
Customer Location	:	Acid Digestion Lab	
Date of Receipt	:	30 March 2022	
Calibrated By	:	Watcharapon Satharan (Technician) 	
Approved By	:	 / Sujar Naknakorn (Site Calibration Manager)	
Date of Issue	:	12 APR 2022	



# Metrollogical Center

## SCI ECO Services Company, Limited

33/2 Moo 3, T.Bampha, A.Kaengkhong, Saraburi 18110

Telephone : +66 2 586 5792-4      Fax : +66 2 586 5109

Website : www.scieco.co.th      E-Mail : calibrate@scg.co.th

---

Calibration No. T230730
Page 2 of 6

### Calibration Report

**Equipment**  
**Date of Calibration**  
**Environment**

**: HEATING BLOCK**

**: 7 April 2022**

**: Temperature : 218.0 ± 0.3 °C**

**: Line Voltage : 221.6-226.5 V**

**: Relative Humidity : 55 - 65 %RH**

**Condition of this results of calibration :**

This equipment was calibrated by insert nine standard thermocouples type T into six chamber , the other one standard thermocouples type T for ambient temperature measurement . The calibration was done in accordance to WF-720.

All data show below were final values and the latest data from customer requests. The temperature ends used was based on ITS - 90 .

**4. Reference Standard Instruments :**

Instrument	Model	Hamamatsu No.	Certificate No.	Due Date
TC	TYPE T	TN221-TN230	T210008	08 June 2022
TC	TYPE T	TN231-TN240	T210008	08 June 2022
DATA LOGGER 3497NA		T149	T210008	08 June 2022

This certificate is issued to :  
 National Institute of Metrology (Thailand) through Metrollogical Center / NSC-TIS-T15 T15 T2N2 CALIBRATION (230730)

**4. Condition of calibrated item : (good)**

**Equipment Description :**

Turn Counter :      2      Hour      25      Minute      At      24      °C

Fresh Air Disperser      ☐ Open      ☒ Close      ☐ Moisture      ☐ Max

☒ No Available

**5. Adjustment :**

**( / ) without adjustment**

**( X ) after adjustment**

Approved By: \_\_\_\_\_

Signature: \_\_\_\_\_

978-0-231-00005-5

## 944115 000/3629-57

1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 2160, 2161, 2162, 2163, 2164, 2165, 2166, 2167, 2168, 2169, 2170, 2171, 2172, 2173, 2174, 2175, 2176, 2177, 2178, 2179, 2180, 2181, 2182, 2183, 2184, 2185, 2186, 2187, 2188, 2189, 2190, 2191, 2192, 2193, 2194, 2195, 2196, 2197, 2198, 2199, 2200, 2201, 2202, 2203, 2204, 2205, 2206, 2207, 2208, 2209, 2210, 2211, 2212, 2213, 2214, 2215, 2216, 2217, 2218, 2219, 2220, 2221, 2222, 2223, 2224, 2225, 2226, 2227, 2228, 2229, 2230, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2238, 2239, 2240, 2241, 2242, 2243, 2244, 2245, 2246, 2247, 2248, 2249, 2250, 2251, 2252, 2253, 2254, 2255, 2256, 2257, 2258, 2259, 2260, 2261, 2262, 2263, 2264, 2265, 2266, 2267, 2268, 2269, 2270, 2271, 2272, 2273, 2274, 2275, 2276, 2277, 2278, 2279, 2280, 2281, 2282, 2283, 2284, 2285, 2286, 2287, 2288, 2289, 2290, 2291, 2292, 2293, 2294, 2295, 2296, 2297, 2298, 2299, 2300, 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2318, 2319, 2320, 2321, 2322, 2323, 2324, 2325, 2326, 2327, 2328, 2329, 2330, 2331, 2332, 2333, 2334, 2335, 2336, 2337, 2338, 2339, 2340, 2341, 2342, 2343, 2344, 2345, 2346, 2347, 2348, 2349, 2350, 2351, 2352, 2353, 2354, 2355, 2356, 2357, 2358, 2359, 2360, 2361, 2362, 2363, 2364, 2365, 2366, 2367, 2368, 2369, 2370, 2371, 2372, 2373, 2374, 2375, 2376, 2377, 2378, 2379, 2380, 2381, 2382, 2383, 2384, 2385, 2386, 2387, 2388, 2389, 2390, 2391, 2392, 2393, 2394, 2395, 2396, 2397, 2398, 2399, 2400, 2401, 2402, 2403, 2404, 2405, 2406, 2407, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417, 2418, 2419, 2420, 2421, 2422, 2423, 2424, 2425, 2426, 2427, 2428, 2429, 2430, 2431, 2432, 2433, 2434, 2435, 2436, 2437, 2438, 2439, 2440, 2441, 2442, 2443, 2444, 2445, 2446, 2447, 2448, 2449, 2450, 2451, 2452, 2453, 2454, 2455, 2456, 2457, 2458, 2459, 2460, 2461, 2462, 2463, 2464, 2465, 2466, 2467, 2468, 2469, 2470, 2471, 2472, 2473, 2474, 2475, 2476, 2477, 2478, 2479, 2480, 2481, 2482, 2483, 2484, 2485, 2486, 2487, 2488, 2489, 2490, 2491, 2492, 2493, 2494, 2495, 2496, 2497, 2498, 2499, 2500, 2501, 2502, 2503, 2504, 2505, 2506, 2507, 2508, 2509, 2510, 2511, 2512, 2513, 2514, 2515, 2516, 2517, 2518, 2519, 2520, 2521, 2522, 2523, 2524, 2525, 2526, 2527, 2528, 2529, 2530, 2531, 2532, 2533, 2534, 2535, 2536, 2537, 2538, 2539, 2540, 2541, 2542, 2543, 2544, 2545, 2546, 2547, 2548, 2549, 2550, 2551, 2552, 2553, 2554, 2555, 2556, 2557, 2558, 2559, 2560, 2561, 2562, 2563, 2564, 2565, 2566, 2567, 2568, 2569, 2570, 2571, 2572, 2573, 2574, 2575, 2576, 2577, 2578, 2579, 2580, 2581, 2582, 2583, 2584, 2585, 2586, 2587, 2588, 2589, 2590, 2591, 2592, 2593, 2594, 2595, 2596, 2597, 2598, 2599, 2600, 2601, 2602, 2603, 2604, 2605, 2606, 2607, 2608, 2609, 2610, 2611, 2612, 2613, 2614, 2615, 2616, 2617, 2618, 2619, 2620, 2621, 2622, 2623, 2624, 2625, 2626, 2627, 2628, 2629, 2630, 2631, 2632, 2633, 2634, 2635, 2636, 2637, 2638, 2639, 2640, 2641, 2642, 2643, 2644, 2645, 2646, 2647, 2648, 2649, 2650, 2651, 2652, 2653, 2654, 2655, 2656, 2657, 2658, 2659, 2660, 2661, 2662, 2663, 2664, 2665, 2666, 2667, 2668, 2669, 2670, 2671, 2672, 2673, 2674, 2675, 2676, 2677, 2678, 2679, 2680, 26

TABLE 1. MECHANISMS



REVIEW BY: Sudat N.  
APPROVED BY: Sudat N.  
NEXT CAL DATE: 01/01/2015

Serial No.: 1700124 Customer No.: 004-002  
Date: 7/06/2012 Carried out by: M. Sathai Pol-on

Certificate No. T228738 Page 5 of 6

## Calibration Report

### Measurement Results

Heating Block	Reading (°C)		Temperature Distribution	
	Min	Average	Stability (°C)	Uncertainty (°C)
100.0	100.0, 100.4	100.1	0.19	0.31
100.0	100.0, 100.4	100.1	0.20	0.29

\* The spread uncertainty includes "adequacy"

The calibration result apply only the above calibrated item.

The result of test was found accurate as shown on data and plot of test only.

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k, which for a normality, providing

a level of confidence of approximately 95 %.

Approved By: [Signature]

FILED: 06/06/2012

analytikjena

### Maintenance works basic unit

- lightness visual check inside the Mercur
- visual check if gold-traps are broken
- visual check if spectrometer is contaminated
- reactor cleaning
- check pump hoses, if necessary change it
- check drying hose, output gas-liquid-separator
- test Bubble-Sensor
- check gas flows
- check volume flows, respants
- recording stray light values
- measurement with 30 ng/l

### Maintenance works Autosampler

- lubricate the dosing-winding (Teflon-grease-spray)
- clean the dosing cylinder, if necessary exchange it
- lubricate the winding system of the height drive with some drops of oil
- check the booted belt
- check the position of the mechanical stopper (height: 13mm)
- check the pump rate of mixing pump (x14s ASS2, typ 7s/20s ASS23, typ 10s)
- check the pump rate of washing cup
- check the electrical hose connections for good contact
- check the connectors of the magnetic valves
- check the dosing hose for bucking, if necessary exchange it

Serial No.: 701 737

## Maintenance Protocol

### Atomic Fluorescence Spectrometer mercur / mercur plus

Device parameter	nominal value	actual value
visual check general tightness inside the Mercur	o.k. <input checked="" type="checkbox"/>	changed: <input type="checkbox"/>
visual check Ostraps	o.k. <input checked="" type="checkbox"/>	changed: <input type="checkbox"/>
visual check spectrometer	o.k. <input checked="" type="checkbox"/>	changed: <input type="checkbox"/>
couette	o.k. <input checked="" type="checkbox"/>	changed: <input type="checkbox"/>
lens	o.k. <input checked="" type="checkbox"/>	changed: <input type="checkbox"/>
check pump hoses	o.k. <input checked="" type="checkbox"/>	changed: <input type="checkbox"/>
check hoses and hose connectors	o.k. <input checked="" type="checkbox"/>	changed: <input type="checkbox"/>
check and clean reactor	o.k. <input checked="" type="checkbox"/>	changed: <input type="checkbox"/>
check drying hose output Gas-liquid-separator	o.k. <input checked="" type="checkbox"/>	changed: <input type="checkbox"/>
check bubble-sensor	o.k. <input checked="" type="checkbox"/>	not o.k.: <input type="checkbox"/>
Check gasflow		
Argon pressure valve 4	1.2 - 1.5 bar	1.5 bar
Valve 1	0.160 M/min	0.169 M/min
Valve 2	0.033 M/min	0.033 M/min
Valve 3	0.002 M/min	0.003 M/min
Valve 4	0.160 M/min	0.166 M/min
Check liquid flow		
Acid	2.5 ml/min	2.5 ml/min
Red-agent	2.5 ml/min	2.5 ml/min
Sample	10 ml/min	10 ml/min
Adventitious light - values	(V)	from file
100	0	0
200	0	0
300	0	0
350	0	0
400	1	1
450	2	2
500	6	6
550	13	13
575	19	19
600	27	28

analytikjena

Device parameter	nominal value	actual value
Blank-solution		
without enrichment / FBR 30 ng/L	Int. > 0.0015	Int. > 0.0005
	RSD < 3 %	RSD < 3 %
Conditions: max conc: 1.7 µg/L, PMT-voltage: <u>345</u> V		
Blank-solution		
with enrichment / FBR 30 ng/L	Int. > 0.008	Int. > 0.0019
	RSD < 3 %	RSD < 3 %
Fok - factor ( Int <sub>1</sub> / Int <sub>2</sub> )	> 3.5	4
Comments		

M. Sathai Pol-on  
Signature Technician  
Bangkok, 7/06/2012  
Place, Date (DDMMYYYY)

serin angkharin  
Signature Customer  
06/06/2012  
Place, Date (DDMMYYYY)

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### Certificate of System Qualification GC-00 / GCMS-00

System ID: GM-10  
Organization Name: ALS Laboratory Group (Thailand) Co., Ltd.  
Organization Location: 104 Pathumwan Rd, Pathumwan Rd, Klong San Luang, 10110 Bangkok 10220

Date: November 23, 2011 11:23 PM  
EQP Name: Agilent/Commodor, Agilent/Commodor  
EQP Revision: GC 63.32, GCMS 02.51  
Overall Qualification Status: Pass

CDS Logon Verification - GC

Logon: Northwest Scotland

Overall CDS Logon Verification - GC Test Status

Pass

System Inspection and Basic Safety and Operation

Name: 7890

Seipoint Status: Pass

Overall System Inspection and Basic Safety and Operation Test Status

Pass

Initial Pressure Accuracy

Name: 7890

Flow: MM

Seipoint Status: Pass

Setpoint

Setpoint

Actual

Accuracy

Agilent Recommended

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### Overall Inlet Pressure Accuracy Test Status

Pass

GC Oven Temperature Accuracy

Name: 7890

Seipoint Status: Pass

Zone: Oven

Temperature: 220.0 225.0 °C

Accuracy: -0.2 °C

Agilent Recommended: ± 1.0 % setpoint in K

Agilent Recommended: ± 1.0 % setpoint in K

Seipoint Status: Pass

Zone: Oven

Temperature: 100.0 99.8 °C

Accuracy: -0.2 °C

Agilent Recommended: ± 1.0 % setpoint in K

Agilent Recommended: ± 1.0 % setpoint in K

Overall GC Oven Temperature Accuracy Test Status

Pass

GC Oven Temperature Stability

Name: 7890

Seipoint Status: Pass

Flow: MM

Temperature: 100.0 99.7533 °C

Stability: 0.1 °C

Agilent Recommended: ± 0.5 °C

Overall GC Oven Temperature Stability Test Status

Pass

Date: November 23, 2011 11:23 PM

System ID: GM-10

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Agilent CDS Lab Compliance Services

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### Test EI

Tested Combination: Flow: MM / External: TQ

Name: 7890

Seipoint Status: Pass

Flow: 1

Seipoint Status: Pass

Flow: 2

Overall Test EI Test Status

Pass

Scouting Run

Tested Combination: Flow: MM / External: TQ

Name: 7890

Source: EI - Extractor

Seipoint Status: Completed

Injection Volume or Capacity: 1.0 µL

Overall Scouting Run Status

Completed

Exhausted Detectors Limit

Tested Combination: Flow: MM / External: TQ

Name: 7890

Source: EI - Extractor

Seipoint Status: Completed

Injection Volume or Capacity: 1.0 µL

Overall Scouting Run Status

Completed

Date: November 23, 2011 11:23 PM

System ID: GM-10

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Signature Status: Pass

Injection Volume in Column: 1.0 µL

Area: 0.05

Retention Time: 0.05

Minimum RSD: 0.79 %

Agilent Recommended: <= 12.00

Status: Pass

Instrument Detection Limit: 1.98035

Agilent Recommended: <= 4.03607

Status: Pass

Overall Instrument Detection Limit Test Status: Pass

Mass Ratio Precision

Tested Combination: Front MMS / External TO

Injection Tower: 7890A

Source: EI - Extractor

Signature Status: Pass

Injection Volume in Column: 1.0 µL

Area Mass: 1

Abundance: 4.07

Misc. Ratio: 0.00

RSD: 0.00 %

Agilent Recommended: <= 0.00

Status: Pass

Overall Mass Ratio Precision Test Status: Pass

Date: November 23, 2021 1:12:35 PM

System ID: GM-10

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Agilent CrossLab Compliance Services

Instrument Details

Purpose

This section describes the as found system configuration.

Details

System

System ID: GM-10

Manufacturer: Agilent Technologies

Name: 7890

Flow Data Input: Manual Data

Temperature Data Input: Manual Data or Other Data Logging

Tested Combination1

Injection Technique: Injection Tower

Inlet: Front

Detector: External

LTM Included?: No

Sampler 1

Manufacturer: Agilent Technologies

Type: Injection Tower

Name: 7893A

Model Number: G4513A

Serial Number: CN18180003

Firmware Revision: A.11.03

Usage: Sample Injection

Location: Front

Syringe Volume (µL): 10

Date: November 23, 2021 1:12:35 PM

System ID: GM-10

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Sampler 2

Manufacturer: Agilent Technologies

Type: Tray

Name: 7893A

Model Number: G4514A

Serial Number: CN18170137

Firmware Revision: A.11.03

Viol Heater: Not installed

Mainframe 1

Manufacturer: Agilent Technologies

Name: 7890

Model Number: G3442B

Serial Number: CN18153080

Firmware Revision: B.02.05

Oven Type: Standard

Inlet 1

Manufacturer: Agilent Technologies

Name: 7890

Type: MMS

Location: Front

Carrier Gas: Helium

Control Type: Electronic Pressure Control (EPC)

Purged Inlet: Yes

Detector 1

Manufacturer: Agilent Technologies

Name: Mass Spectrometer

Type: Mass Spectrometer

Location: External

Date: November 23, 2021 1:12:35 PM

System ID: GM-10

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Agilent CrossLab Compliance Services

Mass Spectrometer 1

Manufacturer: Agilent Technologies

Type: TO

Name: 7000D

Serial Number: US1826U108

Firmware Revision: G.7000.085A

High Vacuum System: Turbo Pump

Scouting Run Standard: OFN Std

MS EI Source 1

Manufacturer: Agilent Technologies

Source Type: EI - Extractor

Number of Filaments: 2

Date: November 23, 2021 1:12:35 PM

System ID: GM-10

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Agilent CrossLab Compliance Services

Electronic Signature

Purpose

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Details

Full Name of Signer: Jarawat Channarong

Logged On User Name: jarawat.channarong@agilent.com

Signature Creation Date: November 23, 2021

Reason for Signature: Executed protocol and published this original version of document

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Date: November 23, 2021 1:12:35 PM

System ID: GM-10

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Agilent CrossLab Compliance Services

ALS, GMS Transaction log:

System ID: GM-10

Print Date: November 23, 2021 1:12:38 PM

Username: ASB000W000

Time	Transaction Date	Activity Performed	Type of Transaction	Optional Information
November 23, 2021 10:13:35 AM	10:13:35 AM	Auto	Session Created	Session
November 23, 2021 10:13:35 AM	10:13:35 AM	Start	Configuration	Session
November 23, 2021 10:13:35 AM	10:13:35 AM	Auto	End/Restart	Logging
November 23, 2021 10:13:35 AM	10:13:35 AM	Auto	Exp/Load	Session
November 23, 2021 10:20:27 AM	10:20:27 AM	End	Configuration	Session
November 23, 2021 10:20:27 AM	10:20:27 AM	End	Configuration	Session
November 23, 2021 10:21:54 AM	10:21:54 AM	Start	Qualification	Session
November 23, 2021 10:21:54 AM	10:21:54 AM	Start	Execution	Session
November 23, 2021 10:21:54 AM	10:21:54 AM	End	Execution	Session
November 23, 2021 10:26:40 AM	10:26:40 AM	End	Execution	Session

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Agilent CrossLab Compliance Services

ALS, GMS Transaction log:

System ID: GM-10

Print Date: November 23, 2021 1:12:38 PM

Username: ASB000W000

Time	Transaction Date	Activity Performed	Type of Transaction	Optional Information
November 23, 2021 10:26:42 AM	10:26:42 AM	Start	Execution	Session
November 23, 2021 10:26:42 AM	10:26:42 AM	End	Execution	Session
November 23, 2021 10:26:42 AM	10:26:42 AM	Start	Execution	Session
November 23, 2021 10:27:01 AM	10:27:01 AM	End	Execution	Session
November 23, 2021 10:27:01 AM	10:27:01 AM	Start	Execution	Session
November 23, 2021 10:27:05 AM	10:27:05 AM	Start	Execution	Session
November 23, 2021 10:27:28 AM	10:27:28 AM	Auto	Data	Session
November 23, 2021 10:27:30 AM	10:27:30 AM	End	Execution	Session
November 23, 2021 10:27:33 AM	10:27:33 AM	Start	Execution	Session
November 23, 2021 10:27:44 AM	10:27:44 AM	Auto	Data	Session

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Agilent CrossLab Compliance Services

ALS, GMS Transaction log:

System ID: GM-10

Print Date: November 23, 2021 1:12:38 PM

Username: ASB000W000

Time	Transaction Date	Activity Performed	Type of Transaction	Optional Information
November 23, 2021 10:27:45 AM	10:27:45 AM	Execution	GC Oven Temperature Accuracy - 7890 - Temperature	Run Count: 1
November 23, 2021 10:28:28 AM	10:28:28 AM	Start	Execution	Session
November 23, 2021 10:28:28 AM	10:28:28 AM	Start	Execution	Session
November 23, 2021 10:28:28 AM	10:28:28 AM	Start	Execution	Session
November 23, 2021 10:27:44 AM	10:27:44 AM	Start	Execution	Session
November 23, 2021 10:28:28 AM	10:28:28 AM	Auto	Data	Session
November 23, 2021 10:28:28 AM	10:28:28 AM	End	Execution	Session
November 23, 2021 10:28:28 AM	10:28:28 AM	Start	Execution	Session
November 23, 2021 10:28:28 AM	10:28:28 AM	End	Execution	Session
November 23, 2021 10:41:01 AM	10:41:01 AM	End	Execution	Session

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Agilent CrossLab Compliance Services

ALS, GMS Transaction log:

System ID: GM-10

Print Date: November 23, 2021 1:12:38 PM

Username: ASB000W000

Time	Transaction Date	Activity Performed	Type of Transaction	Optional Information
November 23, 2021 10:41:13 AM	10:41:13 AM	Execution	Turn EI - 7000D TO - Source - EI - Extractor Filament 2	Run Count: 1
November 23, 2021 10:41:13 AM	10:41:13 AM	End	Execution	Session
November 23, 2021 10:43:42 AM	10:43:42 AM	Start	Execution	Session
November 23, 2021 10:44:20 AM	10:44:20 AM	Auto	Data	Session
November 23, 2021 10:45:10 AM	10:45:10 AM	End	Execution	Session
November 23, 2021 10:45:14 AM	10:45:14 AM	Start	Execution	Session
November 23, 2021 10:45:38 AM	10:45:38 AM	Auto	Data	Session
November 23, 2021 10:45:38 AM	10:45:38 AM	Auto	Data	Session

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User Name: jayesh.chandras	System Id: GM-18			
Hardware: ASD80W0203	Print Date: November 23, 2021 11:28:28 PM			
ALS, GM18 Transaction Log				
Time	Transaction Date	Activity Performed	Type of Transaction	Optional Information
November 23, 2021	Audit	Done	Mean Ratio Precision - Injection	Data File Path:
10:47:23 AM			Trans: From IMA, TO: 0	0: B:\sharad\GM18\Files
			Source: 01 - Extractor - 1 (PSSD)	Source: 01\Extractor_1\PSSD_010
			<=5.00%	
November 23, 2021	End	Execution	Mean Ratio Precision - Injection	Run Count: 1
10:48:02 AM			Trans: From IMA, TO: 0	
			Source: 01 - Extractor - 1 (PSSD)	
			<=5.00%	
November 23, 2021	End	Qualification		OQ
10:48:07 AM				
November 23, 2021	Start	Reporting	Session	None
10:48:07 AM				
November 23, 2021	Audit	AcqCompleted	Session	None
1:01:43 PM				
November 23, 2021	Audit	AcqFailed	Session	None
1:02:30 PM				
November 23, 2021	Audit	SessionRefreshed	Session	None
1:03:32 PM				
November 23, 2021	Start	Qualification	Session	None
1:03:37 PM				
November 23, 2021	Audit	Reporting	Session	Report Generated:
11:56:56 PM				Certificate

Date: November 23, 2021 1:12:36 PM  
System ID: GM-10

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MS E Source 1	
Manufacturer	Agilent Technologies
Source Type	RF - Ion
Number of Filaments	2

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Date: October 26, 2021 2:38:58 PM  
System ID: DM-3  
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Date: October 26, 2021 2:58:58 PM  
System ID: G66-3  
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Date: October 26, 2021 2:58:56 PM  
System ID: GMA-3  
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Date: October 26, 2021 2:38:58 PM  
System ID: OM-3  
Page 13/17

Date: December 26, 2021 2:58:58 PM  
System ID: 0363  
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Date: October 26, 2021 2:38:08 PM  
System ID: GAA-3  
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Date: October 26, 2021 2:38:58 PM  
System ID: DMS-3  
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Cert.No.: 22CH002  
Page: 2 of 2

**Condition of this result of calibration**

1. Reference Standard Instrument >  
Instrument Serial No. ID No. Certificate No. Exp. date  
1) Thermometer 9549224 120PC003 21461 15 Apr 2022

This certification is traceable to the International System of Unit maintained at:-  
- Traceable to National Institute of Metrology (Thailand), NIMT

2. Certified Reference Materials >

- Conductivity calibration solution, CPA chem Ltd., The measurement results are traceable to SI through CPA chem Ltd., ANSI-ASQ National Accreditation Board, Accredited No. AR-1635

Conductivity Solution	Manufacturer	Lot No.	Exp. date
84.000 µS/cm	CPA Chem	754034	28 June 2022
1413.0 µS/cm	CPA Chem	766815	04 Sep 2022
12.880 mS/cm	CPA Chem	761022	02 Aug 2022

- Control Conductivity calibration solution temperature by Water bath (25±0.1) °C

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

**Calibration results**

Function : Conductivity Measurement

(\*) After Adjustment at 1413.0 µS/cm

Conductivity Electrode Serial No.: 5821300533

Standard Conductivity Solution	Before Adjustment UUC* Reading	After Adjustment UUC* Reading	Uncertainty of Measurement (±)	Coverage factor k
84.000 µS/cm	85.52 µS/cm	84.47 µS/cm	0.62 µS/cm	2.00
1413.0 µS/cm	1429 µS/cm	1414 µS/cm	9.2 µS/cm	2.00
12.880 mS/cm	12.92 mS/cm	12.77 mS/cm	0.086 mS/cm	2.00

Remarks : UUC\* = Unit Under Calibration

: Cell constant = 0.549 cm<sup>-1</sup>

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 %.

-odo-

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ภาคผนวก จ

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สำเนาหนังสืออนุญาตขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

ที่ อก ๐๓๑๐(๑)/ ๑๐๖๙



กรมโรงงานอุตสาหกรรม  
ถนนพระรามที่ ๖ เขตราชเทวี  
กรุงเทพมหานคร ๑๐๔๐๐

๒๘ มกราคม ๒๕๖๕

เรื่อง ต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

เรียน กรรมการผู้จัดการ บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกชน  
ลงวันที่ ๓๐ กรกฎาคม ๒๕๖๓

- สิ่งที่ส่งมาด้วย ๑. รายชื่อผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์ จำนวน ๑ แผ่น  
๒. รายชื่อเจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๕ แผ่น  
๓. ขอบข่ายสารมลพิษที่ได้รับขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๓๑ แผ่น

ตามหนังสือที่อ้างถึง บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด ขอต่ออายุ  
หนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ว-๒๐๔ สถานที่ตั้งเลขที่ ๑๐๔  
ซอยพัฒนาการ ๔๐ ถนนพัฒนาการ แขวงพัฒนาการ เขตสวนหลวง กรุงเทพมหานคร  
ต่อกรมโรงงานอุตสาหกรรม นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย)  
จำกัด ต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน โดยมีองค์ประกอบดังนี้

- ก. ผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์ จำนวน ๖ ราย ตามสิ่งที่ส่งมาด้วย ๑  
ข. เจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๑๖๒ ราย ตามสิ่งที่ส่งมาด้วย ๒  
ค. ขอบข่ายสารมลพิษที่ได้รับขึ้นทะเบียนให้วิเคราะห์ในน้ำเสีย จำนวน ๕๙ รายการ น้ำใต้ดิน  
จำนวน ๑๒๖ รายการ อากาศเสีย ๑๖ รายการ สิ่งปฏิกูลหรือวัสดุที่ไม่ใช้แล้ว จำนวน ๓๕ รายการ และดิน  
จำนวน ๑๒๕ รายการ รวมทั้งสิ้นจำนวน ๓๖๑ รายการ ตามสิ่งที่ส่งมาด้วย ๓

หนังสือฉบับนี้จะหมดอายุในวันที่ ๒ กันยายน ๒๕๖๖ หากประสงค์จะต่ออายุหนังสือ  
รับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน ให้ยื่นคำขอต่ออายุพร้อมเอกสารประกอบคำขอ  
ต่อกรมโรงงานอุตสาหกรรม ภายใน ๓๐ วัน ก่อนวันสิ้นอายุของหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์  
เอกชน ซึ่งคำขอต่ออายุดังกล่าวขอรับได้ที่กรมโรงงานอุตสาหกรรม

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

(นายศิริะ จันทรเจต)

นักวิทยาศาสตร์ชำนาญการพิเศษ รักษาการแทน  
ผู้อำนวยการกองวิจัยและเตือนภัยมลพิษโรงงาน  
ปฏิบัติราชการแทนอธิบดีกรมโรงงานอุตสาหกรรม

กองวิจัยและเตือนภัยมลพิษโรงงาน

กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษและทะเบียนห้องปฏิบัติการ

โทร. ๐ ๒๒๐๒ ๔๑๔๖ ๐ ๒๒๐๒ ๔๐๐๒

โทรสาร ๐ ๒๓๕๔ ๓๒๐๘ ๐ ๒๓๕๔ ๓๔๑๕



เอกสารแนบท้ายหนังสือรับต่ออายุขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด

เลขทะเบียน ว-๒๐๔

ที่ อก ๐๓๑๐(๑)/

ลงวันที่ ๒๘ มกราคม ๒๕๖๕

ก. ผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์ จำนวน ๖ ราย

๑) นางสาวยุพาพร จันทร์เปล่ง

ทะเบียนเลขที่ ว-๒๐๔-ค-๔๗๐๐

๒) นางสาวชัชชัย โกมารกุล ณ นคร

ทะเบียนเลขที่ ว-๒๐๔-ค-๔๗๐๑

๓) นายศรายุทธ จิตรานนท์

ทะเบียนเลขที่ ว-๒๐๔-ค-๔๗๐๒

๔) นางสาวกนกกร เอนก

ทะเบียนเลขที่ ว-๒๐๔-ค-๖๑๑๑

๕) นายสุริยา สอนแก้ว

ทะเบียนเลขที่ ว-๒๐๔-ค-๖๑๑๒

๖) นายวิชาญ ชูณหะวัณ

ทะเบียนเลขที่ ว-๒๐๔-ค-๖๑๑๓

(นายศิริระ จันทรเจ็ด)

นักวิทยาศาสตร์ชำนาญการพิเศษ รักษาการแทน

ผู้อำนวยการกองวิจัยและเตือนภัยมลพิษโรงงาน

ปฏิบัติราชการแทนอธิบดีกรมโรงงานอุตสาหกรรม

เอกสารแนบท้ายหนังสือรับต่ออายุขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด

เลขทะเบียน ว-๒๐๔

ที่ อก ๐๓๑๐(๑)/ ๑๐๖๙

ลงวันที่ ๒๘ มกราคม ๒๕๖๕

ข. เจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๑๖๒ ราย

๑) นางสาวจินดา ไชจุลธรรม	ทะเบียนเลขที่ ว-๒๐๔-จ-๔๗๐๘
๒) นางสาวสาวิตรี น้อยเสงี่ยม	ทะเบียนเลขที่ ว-๒๐๔-จ-๔๗๐๙
๓) นางสาวชนัญญาญจน์ อัมขม	ทะเบียนเลขที่ ว-๒๐๔-จ-๔๗๑๐
๔) นางสาวนรินทร์ สายเส็ง	ทะเบียนเลขที่ ว-๒๐๔-จ-๔๗๑๕
๕) นางสาวนันทวดี สมบูรณ์	ทะเบียนเลขที่ ว-๒๐๔-จ-๔๗๑๖
๖) นางสาวศรัณยา เฉลิมธำรงค์	ทะเบียนเลขที่ ว-๒๐๔-จ-๔๗๑๗
๗) นางสาวสรารักษ์ มงคลจิรวุฒิ	ทะเบียนเลขที่ ว-๒๐๔-จ-๔๗๑๙
๘) นางสาวศิริลักษณ์ พึ่งแพง	ทะเบียนเลขที่ ว-๒๐๔-จ-๔๗๒๐
๙) นายณพพงศ์ จันทรพันธุ์	ทะเบียนเลขที่ ว-๒๐๔-จ-๕๔๐๘
๑๐) นายนรเศรษฐ์ โกมลาลัย	ทะเบียนเลขที่ ว-๒๐๔-จ-๕๔๑๑
๑๑) นายธันวา จริยา	ทะเบียนเลขที่ ว-๒๐๔-จ-๕๔๑๔
๑๒) นางสาวเกศรินทร์ แก้วมัน	ทะเบียนเลขที่ ว-๒๐๔-จ-๕๔๑๖
๑๓) นางสาวสุวิมล ชัยเรืองวุฒิ	ทะเบียนเลขที่ ว-๒๐๔-จ-๕๔๑๗
๑๔) นางสาวสุชาดา ธรรมถาวร	ทะเบียนเลขที่ ว-๒๐๔-จ-๕๔๒๑
๑๕) นางสาวเบมิกา ชัยเดชธนกุล	ทะเบียนเลขที่ ว-๒๐๔-จ-๕๔๒๓
๑๖) นางสาวศศิธร หมูสวัสดิ์	ทะเบียนเลขที่ ว-๒๐๔-จ-๕๔๒๔
๑๗) นางสาวเสาวลักษณ์ ภู่นาอำพร	ทะเบียนเลขที่ ว-๒๐๔-จ-๕๔๒๕
๑๘) นายอภิสิทธิ์ สิงหา	ทะเบียนเลขที่ ว-๒๐๔-จ-๕๔๒๖
๑๙) นายศักดิ์สิทธิ์ ไพศาลพิสุทธ์	ทะเบียนเลขที่ ว-๒๐๔-จ-๕๔๒๗
๒๐) ว่าที่ร้อยตรีหญิง พรรณิภา ขำเจริญ	ทะเบียนเลขที่ ว-๒๐๔-จ-๕๔๒๘
๒๑) นางจิตดา คำภูแก้ว	ทะเบียนเลขที่ ว-๒๐๔-จ-๕๔๓๑
๒๒) นางสาวอรรพรรณ รักยง	ทะเบียนเลขที่ ว-๒๐๔-จ-๖๑๑๕
๒๓) นางสาวนพรัตน์ แยมกรานต์	ทะเบียนเลขที่ ว-๒๐๔-จ-๖๑๑๙
๒๔) นายจุลเดช วารินทร์	ทะเบียนเลขที่ ว-๒๐๔-จ-๖๑๒๐
๒๕) นางสาวดาญรัตน์ ร้องคำ	ทะเบียนเลขที่ ว-๒๐๔-จ-๖๑๒๑
๒๖) นายนคร สุขเจริญ	ทะเบียนเลขที่ ว-๒๐๔-จ-๖๑๒๒
๒๗) นายบัญชา นามเขตต์	ทะเบียนเลขที่ ว-๒๐๔-จ-๖๑๒๓
๒๘) นายพรมมี ศรีปัดเนตร	ทะเบียนเลขที่ ว-๒๐๔-จ-๖๑๒๕
๒๙) นายอุทิศ อุ่นสีม	ทะเบียนเลขที่ ว-๒๐๔-จ-๖๑๒๖
๓๐) ว่าที่ร้อยตรี เฉลิมเกียรติ อมรศรีเสริม	ทะเบียนเลขที่ ว-๒๐๔-จ-๖๑๒๘
๓๑) นางสาววริยา สร้างนา	ทะเบียนเลขที่ ว-๒๐๔-จ-๖๑๒๙
๓๒) นายอนุพงศ์ รัตนศรีประเสริฐ	ทะเบียนเลขที่ ว-๒๐๔-จ-๖๑๓๐
๓๓) นางสาวจุฑารัตน์ โอนสันเทียะ	ทะเบียนเลขที่ ว-๒๐๔-จ-๖๑๔๒
๓๔) นางสาวจรรววรรณ พิมพ์อริกฤติยา	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๗๖

(นายศิระ จันทร์เจิด)

๓๕) นางสาวปรารค์ทิพย์...

นักวิทยาศาสตร์ชำนาญการพิเศษ วิชาการการแพทย์

ผู้อำนวยการกองวิจัยและเตือนภัยมลพิษโรงงาน

สำนักงานคณะกรรมการอาหารและยา

๓๕) นางสาวปรางค์ทิพย์ กิจไพศาลศักดิ์	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๗๙
๓๖) นางสาวเดือนใจ ทางกลาง	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๘๐
๓๗) นางสาวจิราพร ศิริเวช	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๘๑
๓๘) นายวรกร ผูกרך	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๘๒
๓๙) นายทอง วิริยะสทกิจ	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๘๓
๔๐) นายธนิต เจนจบ	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๘๔
๔๑) นายคณิศร ขำเพชร	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๘๕
๔๒) นายอรรคพล นิยมวิทยาพันธ์	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๘๖
๔๓) นายภูวิช พรหมสะอาด	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๘๗
๔๔) นายธนเดช โภคาพิพัฒน์	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๘๘
๔๕) นายชวฤทธิ์ วงษ์จันทร์	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๘๙
๔๖) นายอาทิตย์ ศรีแสน	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๙๐
๔๗) นายเจษฎินทร์ คงศักดิ์ไทย	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๙๑
๔๘) นายจรัส บุญยิ่ง	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๙๒
๔๙) นายธนาณัติ เอนก	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๙๓
๕๐) นายอภิวัฒน์ ทุมหนู	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๙๔
๕๑) นางสาวสุภาขวัญ มาก	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๙๕
๕๒) นางสาวทัตพร ขวาลสมบุรณ์	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๑๐๐
๕๓) นางสาวธิดิมา บุญเพ็ง	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๑๐๑
๕๔) นางสาวกนกอร เข้มเพ็ชร	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๑๐๒
๕๕) นางสาวพัชรียา หงษ์สมดี	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๑๐๓
๕๖) นางสาวภาวนิดา สุรวงศ์ตระกูล	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๑๐๔
๕๗) นางสาวภาณุมาศ นามวัฒน์	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๑๐๕
๕๘) นางสาวอุไรรัตน์ ทิงสร้างแป้น	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๑๐๖
๕๙) นายธีรวัฒน์ ปวงสุข	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๑๐๗
๖๐) นายอิทธิพล ยะโส	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๑๐๘
๖๑) นายประพจน์ วรรณชูชัย	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๑๐๙
๖๒) นายชยธร พวงทิพย์	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๑๑๐
๖๓) นางสาวกนกวรรณ จันทบาล	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๑๑๑
๖๔) นางสาวเกษร หลักบุญ	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๑๑๒
๖๕) นายสิทธิโชค ธงเงิน	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๑๑๓
๖๖) นางศิลปวรรณ ใจบุญ	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๕๐๕
๖๗) นางสาวพรรณธิดา พุ่มคง	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๕๐๘
๖๘) นางสาวศรณีย์ ยิ่งดี	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๕๐๙
๖๙) นายนวกัทร ศรีวิริยะ	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๕๑๐
๗๐) นายสุวิชา ทองอ่อน	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๕๑๑
๗๑) นายวิญญู บุญตะนัย	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๕๑๓

(นายศิริระ จันทรเจ็ด)

นักวิทยาศาสตร์ชำนาญการพิเศษ รักษาการแทน

ผู้อำนวยการกองวิจัยและเตือนภัยมลพิษโรงงาน

กระทรวงอุตสาหกรรม

๗๒) นายสมบุรณ์...



๑๐๙) นายนนทชัย...

๑๐๙) นายพนนพชัย อุปถัมภ์	ทะเบียนเลขที่ ว-๒๐๔-จ-๘๕๙๔
๑๑๐) นายณัฐพล คุณสุทธิ	ทะเบียนเลขที่ ว-๒๐๔-จ-๘๕๙๕
๑๑๑) นายณันทวัฒน์ สาริน	ทะเบียนเลขที่ ว-๒๐๔-จ-๘๕๙๖
๑๑๒) นายปิยะนัฐ พลมะศรี	ทะเบียนเลขที่ ว-๒๐๔-จ-๘๕๙๗
๑๑๓) นายพงศ์สิริ โสมเขียว	ทะเบียนเลขที่ ว-๒๐๔-จ-๘๕๙๘
๑๑๔) นายพีรพัฒน์ กำคำ	ทะเบียนเลขที่ ว-๒๐๔-จ-๘๕๙๙
๑๑๕) นายภาณุพงศ์ มานิตย์	ทะเบียนเลขที่ ว-๒๐๔-จ-๘๖๐๐
๑๑๖) นายมงคล ผลาทิพย์	ทะเบียนเลขที่ ว-๒๐๔-จ-๘๖๐๑
๑๑๗) นายมนุรินทร์ พูลศิริ	ทะเบียนเลขที่ ว-๒๐๔-จ-๘๖๐๒
๑๑๘) นายสิรินันท์ ทองอ้น	ทะเบียนเลขที่ ว-๒๐๔-จ-๘๖๐๓
๑๑๙) นายอเนชา ทันสมัย	ทะเบียนเลขที่ ว-๒๐๔-จ-๘๖๐๔
๑๒๐) นายอดิศักดิ์ ผมไผ	ทะเบียนเลขที่ ว-๒๐๔-จ-๘๖๐๕
๑๒๑) นายอนันตชัย วิสุม	ทะเบียนเลขที่ ว-๒๐๔-จ-๘๖๐๖
๑๒๒) นายณัฐดนัย เจือละออง	ทะเบียนเลขที่ ว-๒๐๔-จ-๘๖๐๗
๑๒๓) นายวรวิธ ดินัก	ทะเบียนเลขที่ ว-๒๐๔-จ-๘๖๐๘
๑๒๔) นายแสงตะวัน นະตะສັດ	ทะเบียนเลขที่ ว-๒๐๔-จ-๘๖๐๙
๑๒๕) นายยุทธพงศ์ รัตนะ	ทะเบียนเลขที่ ว-๒๐๔-จ-๘๖๑๐
๑๒๖) นายชัยวุฒิ ไชยชนะ	ทะเบียนเลขที่ ว-๒๐๔-จ-๘๖๑๑
๑๒๗) นายวิศรุต ศรีธรรมมา	ทะเบียนเลขที่ ว-๒๐๔-จ-๘๖๑๒
๑๒๘) นายพนนทกร เผือกผ่อง	ทะเบียนเลขที่ ว-๒๐๔-จ-๘๖๑๓
๑๒๙) นายกำชัย สุทธะ	ทะเบียนเลขที่ ว-๒๐๔-จ-๘๖๑๔
๑๓๐) นางสาวณัฐภรณ์ รักทะเล	ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๑๙
๑๓๑) นางสาวประภาภรณ์ บุตรพรม	ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๒๐
๑๓๒) นางสาวนิลาวัลย์ นามพรม	ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๒๑
๑๓๓) นางสาวพัชรินทร์ แสนสร้อย	ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๒๒
๑๓๔) นายไพโรจน์ เปี่ยมพิมาย	ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๒๓
๑๓๕) นางสาวศุภมาศ ทองมาก	ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๒๔
๑๓๖) นางสาวลลิตา จิตรสว่าง	ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๒๕
๑๓๗) นางสาวชไมพร เสิกภูเขียว	ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๒๖
๑๓๘) นางสาวกฤติมาพร คำมีแก่น	ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๒๗
๑๓๙) นางสาวสกลรัตน์ ภาควุฒิ	ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๒๘
๑๔๐) นางสาวกาญจนา คงคุณ	ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๒๙
๑๔๑) นางสาวไพรินทร์ ศรีรูปี	ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๓๐
๑๔๒) นางสาวทิพนันดา ฝูปัญญา	ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๓๑
๑๔๓) นางสาวสาธิตา ปานทอง	ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๓๒
๑๔๔) นางสาวอริสา ทองนวล	ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๓๓
๑๔๕) นางสาวอริยา คำคลอง	ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๓๔

(นายศิริ จันทรเจ็ด)

นักวิทยาศาสตร์ชำนาญการพิเศษ รักษาการแทน

ผู้อำนวยการกองวิจัยและเตือนภัยมลพิษโรงงาน

๑๔๖) นางสาวบุษดาภรณ์...

๑๔๖) นางสาวชุตากรณ์ สุนทรสนาน	ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๓๕
๑๔๗) นางสาวสุดารัตน์ นนท์ประสาท	ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๓๖
๑๔๘) นางสาวรัชนิกร เนียมกลาง	ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๓๗
๑๔๙) นางสาวกัญญารัตน์ ศรีนิลทา	ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๓๘
๑๕๐) นางสาวอัญชลี คำจันทร์	ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๓๙
๑๕๑) นายบุญฤทธิ์ เอี่ยมเทศ	ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๔๐
๑๕๒) นายศิริวัฒน์ พานิชย์	ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๔๑
๑๕๓) นางสาวศุภรดา ปันมยุรา	ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๔๒
๑๕๔) นางสาวพาฤดี คุณนาน	ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๔๓
๑๕๕) นางสาวจิราเจต พองดา	ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๔๔
๑๕๖) นางสาวกนกภรณ์ อุระ	ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๔๕
๑๕๗) นางสาวอารยา มีชัย	ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๔๖
๑๕๘) นางสาวจิตสุภา ประเทืองสุข	ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๔๗
๑๕๙) นางสาวอริสา วิริยขันติธรรม	ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๔๘
๑๖๐) นางสาววิษุตา นาคผจญ	ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๔๙
๑๖๑) นางสาวพนิดา ยอดอินทร์	ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๕๐
๑๖๒) นางสาวนันทิยา จันทะสุน	ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๕๑



(นายศิริระ จันท์เจ็ด)

นักวิทยาศาสตร์ชำนาญการพิเศษ รักษาการแทน

ผู้อำนวยการกองวิจัยและเตือนภัยมลพิษโรงงาน

ปฏิบัติราชการแทนอธิบดีกรมโรงงานอุตสาหกรรม



เอกสารแนบท้ายหนังสือรับต่ออายุขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด

เลขทะเบียน ว-๒๐๔

ที่ อก ๐๓๑๐(๑)/ ๑๐๖๕

ลงวันที่ ๒๘ มกราคม ๒๕๖๕

ขอขยายสารมลพิษที่ได้รับขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๓๖๑ รายการ

น้ำเสีย จำนวน 59 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Aldicarb	High-Performance Liquid Chromatographic Method <sup>[4]</sup>
2	Aldicarb Sulfone	High-Performance Liquid Chromatographic Method <sup>[4]</sup>
3	Aldicarb Sulfoxide	High-Performance Liquid Chromatographic Method <sup>[4]</sup>
4	Aldrin	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup>
5	Arsenic	1) Digestion, Inductively Coupled Plasma Method <sup>[4]</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>[4]</sup>
6	Barium	1) Digestion, Inductively Coupled Plasma Method <sup>[4]</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>[4]</sup>
7	$\alpha$ -BHC	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup>
8	$\beta$ -BHC	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup>
9	$\delta$ -BHC	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup>
10	$\gamma$ -BHC	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup>
11	Biochemical Oxygen Demand	1) 5-Day BOD Test, Azide Modification Method <sup>[4]</sup> 2) 5-Day BOD Test, Membrane Electrode Method <sup>[4]</sup>
12	Carbaryl	High-Performance Liquid Chromatographic Method <sup>[4]</sup>
13	Carbofuran	High-Performance Liquid Chromatographic Method <sup>[4]</sup>
14	Cadmium	1) Digestion, Inductively Coupled Plasma Method <sup>[4]</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>[4]</sup>
15	Chemical Oxygen Demand	1) Closed Reflux, Colorimetric Method <sup>[4]</sup> 2) Closed Reflux, Titrimetric Method <sup>[4]</sup>
16	Chlordane	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup>
17	Chromium	1) Digestion, Inductively Coupled Plasma Method <sup>[4]</sup> 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>[4]</sup>
18	Color	ADMI Weighted-Ordinate Spectrophotometric Method



(นางริกาญจน์ จันทรกุลวิไล)

ผู้อำนวยการกลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษ

และทะเบียนห้องปฏิบัติการ

19 Copper...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
19	Copper	1) Digestion, Inductively Coupled Plasma Method <sup>[4]</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>[4]</sup>
20	Cyanide	Distillation, Colorimetric Method <sup>[4]</sup>
21	2,4'-DDD	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup>
22	4,4'-DDD	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup>
23	2,4'-DDE	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup>
24	4,4'-DDE	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup>
25	2,4'-DDT	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup>
26	4,4'-DDT	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup>
27	Dieldrin	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup>
28	Endosulfan Sulfate	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup>
29	Endosulfan I	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup>
30	Endosulfan II	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup>
31	Endrin	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup>
32	Endrin Aldehyde	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup>
33	Formaldehyde	Distillation, Colorimetric Method <sup>[3]</sup>
34	Free Chlorine	1) DPD Ferrous Titrimetric Method <sup>[4]</sup> 2) Iodometric Method <sup>[4]</sup>
35	Heptachlor	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup>
36	Heptachlor epoxide	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup>
37	Hexavalent Chromium	Filtration, Colorimetric Method <sup>[4]</sup>
38	3-Hydroxycarbofuran	High-Performance Liquid Chromatographic Method <sup>[4]</sup>
39	Lead	1) Digestion, Inductively Coupled Plasma Method <sup>[4]</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>[4]</sup>
40	Manganese	1) Digestion, Inductively Coupled Plasma Method <sup>[4]</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>[4]</sup>
41	Mercury	1) Digestion, Cold-Vapor Atomic Absorption Spectrometric Method <sup>[4]</sup> 2) Digestion, Inductively Coupled Plasma/Mass spectrometric Method <sup>[4]</sup>
42	Methiocarb	High-Performance Liquid Chromatographic Method <sup>[4]</sup>
43	Methoxychlor	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup>

วิมล

44 Methomyl...

(นางริกาญจน์ อัครสกุลวิไล)

ผู้อำนวยการกลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษ

กรมส่งเสริมการค้าระหว่างประเทศ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
44	Methomyl	High-Performance Liquid Chromatographic Method <sup>[4]</sup>
45	Nickel	1) Digestion, Inductively Coupled Plasma Method <sup>[4]</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>[4]</sup>
46	Oil & Grease	1) Liquid-Liquid, Partition-Gravimetric Method <sup>[4]</sup> 2) Soxhlet Extraction Method <sup>[4]</sup>
47	Oxamyl	High-Performance Liquid Chromatographic Method <sup>[4]</sup>
48	Propoxur	High-Performance Liquid Chromatographic Method <sup>[4]</sup>
49	pH	Electrometric Method <sup>[4]</sup>
50	Phenols	1) Distillation, Chloroform Extraction Method <sup>[4]</sup> 2) Distillation, Direct Photometric Method <sup>[4]</sup>
51	Selenium	1) Digestion, Inductively Coupled Plasma Method <sup>[4]</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>[4]</sup>
52	Sulfide	Iodometric Method <sup>[4]</sup>
53	Temperature	Laboratory and Field Methods <sup>[4]</sup>
54	Total Dissolved Solids	Dried at 180 °C <sup>[4]</sup>
55	Total Kjeldahl Nitrogen	Semi-Micro Kjeldahl Method <sup>[4]</sup>
56	Total Suspended Solids	Dried at 103-105 °C <sup>[4]</sup>
57	Toxaphene	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup>
58	Trivalent Chromium	1) Digestion, Inductively Coupled Plasma Method; Colorimetric Method; Calculation <sup>[4]</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method; Colorimetric Method; Calculation <sup>[4]</sup>
59	Zinc	1) Digestion, Inductively Coupled Plasma Method <sup>[4]</sup> 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>[4]</sup>

น้ำใต้ดิน จำนวน 126 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Acenaphthene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
2	Acetone	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>

วิมล

3 Aldrin...

(นางริภาณจน์ ฉัตรสกุลวิไล)

ผู้อำนวยการกลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษ  
และทะเบียนห้องปฏิบัติการ



ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
3	Aldrin	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
4	Anthracene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
5	Antimony	1) Digestion, Inductively Coupled Plasma Method <sup>[4]</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>[4]</sup>
6	Arsenic	1) Digestion, Inductively Coupled Plasma Method <sup>[4]</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>[4]</sup>
7	Atrazine	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
8	Barium	1) Digestion, Inductively Coupled Plasma Method <sup>[4]</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>[4]</sup>
9	Benz(a)anthracene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
10	Benzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
11	Benzo(b)fluoranthene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
12	Benzo(k)fluoranthene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
13	Benzoic Acid	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
14	Benzo(a)pyrene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
15	Benzo[g,h,i]perylene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
16	Beryllium	1) Digestion, Inductively Coupled Plasma Method <sup>[4]</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>[4]</sup>
17	Bis(2-chloroethyl)ether	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>

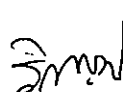
วิธีทาง)

18 Bis(2-ethylhexyl)phthalate...

(นางริกาญจน์ ฉัตรสกุลวิไล)

ผู้อำนวยการกลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษ  
และทะเบียนห้องปฏิบัติการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
18	Bis(2-ethylhexyl)phthalate	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
19	Bromodichloromethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
20	Bromoform	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
21	Butanol	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
		Equilibrium Headspace, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
22	Butyl Benzyl Phthalate	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
23	Cadmium	1) Digestion, Inductively Coupled Plasma Method <sup>[4]</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>[4]</sup>
24	Carbazole	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
25	Carbon Disulfide	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
26	Carbon tetrachloride	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
27	Chlordane	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
28	p-Chloroaniline	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
29	Chlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
30	Chlorodibromomethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
31	Chloroform	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
32	2-Chlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
33	Chromium	1) Digestion, Inductively Coupled Plasma Method <sup>[4]</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>[4]</sup>



34 Chromium (III)...

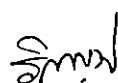
(นางริกาญจน์ จิตรสกุลไธ)

ผู้อำนวยการกลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษ





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



(นางริกาญจน์ จิตรสกุลวิไล)

ผู้อำนวยการกลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษ  
และทะเบียนห้องปฏิบัติการ

68 Fluorene...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
68	Fluorene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
69	Heptachlor	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
70	Heptachlor epoxide	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
71	Hexachlorobenzene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
72	Hexachloro-1,3-butadiene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
73	n-Hexane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
74	$\alpha$ -HCH	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
75	$\beta$ -HCH	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
76	$\gamma$ -HCH	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
77	Hexachlorocyclopentadiene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
78	Hexachloroethane	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
79	Indeno(1,2,3-cd)pyrene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
80	Isophorone	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
81	Lead	1) Digestion, Inductively Coupled Plasma Method <sup>[4]</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>[4]</sup>
82	Manganese	1) Digestion, Inductively Coupled Plasma Method <sup>[4]</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>[4]</sup>
83	Mercury	1) Cold Vapor Atomic Absorption Spectrometric Method <sup>[4]</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>[4]</sup>

ร.พ.ว.

84 Methanol...

(นางริกาญจน์ ฉัตรสกุลวิไล)

ผู้อำนวยการกลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษ

แบบฟอร์มแจ้งผลการวิเคราะห์

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
84	Methanol	1) Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup> 2) Equilibrium Headspace, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
85	Methoxychlor	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
86	Methyl Bromide	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
87	Methylene Chloride	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
88	2-Methylphenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
89	2-Methylnaphthalene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
90	Methyl tert-Butyl Ether	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
91	Naphthalene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
92	Nickel	1) Digestion, Inductively Coupled Plasma Method <sup>[4]</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>[4]</sup>
93	Nitrobenzene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
94	N-Nitrosodiphenylamine	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
95	N-Nitrosodi-n-Propylamine	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
96	Polychlorinated Biphenyls - PCB 1016 - PCB 1221 - PCB 1232 - PCB 1242 - PCB 1248 - PCB 1254 - PCB 1260	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>

วิมล

97 Pentachlorophenol...

(นางริกาญจน์ ฉัตรสกุลวิไล)

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และทะเบียนห้องปฏิบัติการ



ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
97	Pentachlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
98	pH	Electrometric Method <sup>[4]</sup>
99	Phenanthrene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
100	Phenol	1) Distillation, Direct Photometric Method <sup>[4]</sup> 2) Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
101	Pyrene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
102	Selenium	1) Digestion, Inductively Coupled Plasma Method <sup>[4]</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>[4]</sup>
103	Silver	1) Digestion, Inductively Coupled Plasma Method <sup>[4]</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>[4]</sup>
104	Styrene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
105	1,1,2,2-Tetrachloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
106	Tetrachloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
107	Toluene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
108	Toxaphene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
109	TPH (C <sub>5</sub> -C <sub>9</sub> )	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>[13,24]</sup>
110	TPH (C <sub>8</sub> -C <sub>16</sub> )	Solvent Extraction, Gas Chromatographic Method <sup>[9,21]</sup>
111	TPH (C <sub>16</sub> -C <sub>35</sub> )	Solvent Extraction, Gas Chromatographic Method <sup>[9,21]</sup>
112	1,2,4-Trichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
113	1,1,1-Trichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>

วิมล

114 1,1,2-Trichloroethane...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
114	1,1,2-Trichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
115	Trichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
116	2,4,5-Trichlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
117	2,4,6-Trichlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
118	1,3,5-Trimethylbenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
119	Vanadium	1) Digestion, Inductively Coupled Plasma Method <sup>[4]</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>[4]</sup>
120	Vinyl Acetate	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
121	Vinyl Chloride	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
122	m-Xylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
123	o-Xylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
124	p-Xylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
125	Xylene (Total)	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
126	Zinc	1) Digestion, Inductively Coupled Plasma Method <sup>[4]</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>[4]</sup>

**อากาศเสีย (ปล่อยระบาย) จำนวน 16 รายการ**

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Antimony	Isokinetic, Digestion, Inductively Coupled Plasma Method <sup>[5]</sup>
2	Arsenic	Isokinetic, Digestion, Inductively Coupled Plasma Method <sup>[5]</sup>

*วิฑูรย์*

3 Carbon Monoxide...

(นางริกาญจน์ ฉัตรสกุลวิไล)

ผู้อำนวยการกลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษ

และหน่วยงานที่เกี่ยวข้อง

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
3	Carbon Monoxide	1) Sampling Bag Non-Dispersive Infrared Method <sup>[5]</sup> 2) Non-Dispersive Infrared Method <sup>[5]</sup> 3) Instrumental Analyzer Method <sup>[5]</sup>
4	Chlorine	1) Absorption Sampling, Ion Chromatographic Method <sup>[5]</sup> 2) Isokinetic Sampling, Ion Chromatographic Method <sup>[5]</sup>
5	Copper	Isokinetic, Digestion, Inductively Coupled Plasma Method <sup>[5]</sup>
6	Dioxins	Isokinetic Sampling, Analysis by ISO/IEC 17025 Accredited Laboratory or Analysis by Department of Industrial Works Registered Laboratory (Dioxins/Furans Analysis Approved) <sup>[5]</sup>
7	Hydrogen Chloride	1) Absorption Sampling, Ion Chromatographic Method <sup>[5]</sup> 2) Isokinetic Sampling, Ion Chromatographic Method <sup>[5]</sup>
8	Hydrogen Sulfide	Absorption Sampling, Iodometric Method <sup>[5]</sup>
9	Lead	Isokinetic, Digestion, Inductively Coupled Plasma Method <sup>[5]</sup>
10	Mercury	1) Isokinetic Sampling, Digestion, Cold-Vapor Atomic Absorption Spectrometric Method <sup>[5]</sup> 2) Isokinetic, Digestion, Inductively Coupled Plasma Method <sup>[5]</sup>
11	Opacity	Ringelmann's Method <sup>[2]</sup>
12	Oxides of Nitrogen	1) Absorption Sampling, Phenoldisulfonic Acid Method <sup>[5]</sup> 2) Chemiluminescence Method <sup>[5]</sup> 3) Instrumental Analyzer Method <sup>[5]</sup>
13	Sulfur Dioxide	1) Absorption Sampling, Barium-Thorin Titrimetric Method <sup>[5]</sup> 2) UV Fluorescence Method <sup>[5]</sup> 3) Instrumental Analyzer Method <sup>[5]</sup>
14	Sulfuric Acid	Isokinetic Sampling, Barium-Thorin Titrimetric Method <sup>[5]</sup>
15	Total Suspended Particulate	Isokinetic Sampling, Gravimetric Method <sup>[5]</sup>
16	Xylene	Adsorption Sampling, Gas Chromatographic Method <sup>[5]</sup>

วิมล

สิ่งปลูก...

(นางริกาญจน์ ฉัตรสกุลวิไล)

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กรมควบคุมมลพิษ



สิ่งปฏิกูลหรือวัสดุที่ไม่ใช้แล้ว จำนวน 35 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Aldrin	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[1,9,25]</sup> 2) Soxhlet Extraction, Gas Chromatographic Method <sup>[10,22]</sup> 3) Automated Soxhlet Extraction, Gas Chromatographic Method <sup>[22,31]</sup>
2	Antimony	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[1,6,15]</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>[1,6,16]</sup> 3) Digestion, Inductively Coupled Plasma Method <sup>[7,15]</sup> 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>[7,16]</sup>
3	Arsenic	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[1,6,15]</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>[1,6,16]</sup> 3) Digestion, Inductively Coupled Plasma Method <sup>[7,15]</sup> 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>[7,16]</sup>
4	Barium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[1,6,15]</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>[1,6,16]</sup> 3) Digestion, Inductively Coupled Plasma Method <sup>[7,15]</sup> 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>[7,16]</sup>
5	Beryllium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[1,6,15]</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>[1,6,16]</sup> 3) Digestion, Inductively Coupled Plasma Method <sup>[7,15]</sup> 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>[7,16]</sup>

วิมล

6 Cadmium...

(นางริกาญจน์ ฉัตรสกุลวิไล)

ผู้อำนวยการกลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษ

และทะเบียนห้องปฏิบัติการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
6	Cadmium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[1,6,15]</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>[1,6,16]</sup> 3) Digestion, Inductively Coupled Plasma Method <sup>[7,15]</sup> 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>[7,16]</sup>
7	Chlordane	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[1,19,25]</sup> 2) Soxhlet Extraction, Gas Chromatographic Method <sup>[10,22]</sup> 3) Automated Soxhlet Extraction, Gas Chromatographic Method <sup>[22,31]</sup>
8	Chromium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[1,6,15]</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>[1,6,16]</sup> 3) Digestion, Inductively Coupled Plasma Method <sup>[7,15]</sup> 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>[7,16]</sup>
9	Chromium (III)	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method; Waste Extraction, Colorimetric Method; Calculation Method <sup>[1,6,15,17]</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method; Waste Extraction, Colorimetric Method; Calculation Method <sup>[1,6,16,17]</sup> 3) Digestion, Inductively Coupled Plasma Method; Alkaline Digestion, Colorimetric Method; Calculation Method <sup>[7,8,15,17]</sup> 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method; Alkaline Digestion, Colorimetric Method; Calculation Method <sup>[7,8, 16,17]</sup>
10	Chromium (VI)	1) Waste Extraction, Colorimetric Method <sup>[1,6,17]</sup> 2) Alkaline Digestion, Colorimetric Method <sup>[8,17]</sup>



(นางริกาญจน์ จิตรสกุลวิไล)

11 Cobalt...

ผู้อำนวยการกลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษ

.....เรียน...../.....

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
11	Cobalt	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[1,6,15]</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>[1,6,16]</sup> 3) Digestion, Inductively Coupled Plasma Method <sup>[7,15]</sup> 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>[7,16]</sup>
12	Copper	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[1,6,15]</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>[1,6,16]</sup> 3) Digestion, Inductively Coupled Plasma Method <sup>[7,15]</sup> 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>[7,16]</sup>
13	2,4-D	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[1,9,25]</sup> 2) Soxhlet Extraction, Gas Chromatographic Method <sup>[10,22]</sup> 3) Automated Soxhlet Extraction, Gas Chromatographic Method <sup>[22,31]</sup>
14	DDD	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[1,9,25]</sup> 2) Soxhlet Extraction, Gas Chromatographic Method <sup>[10,22]</sup> 3) Automated Soxhlet Extraction, Gas Chromatographic Method <sup>[22,31]</sup>
15	DDE	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[1,9,25]</sup> 2) Soxhlet Extraction, Gas Chromatographic Method <sup>[10,22]</sup> 3) Automated Soxhlet Extraction, Gas Chromatographic Method <sup>[22,31]</sup>
16	DDT	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[1,9,25]</sup>

จิราภรณ์

2) Soxhlet...

(นางริกาญจน์ จัตรสกุลวิไล)

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และทะเบียนห้องปฏิบัติการ



ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
17	Dieldrin	2) Soxhlet Extraction, Gas Chromatographic Method <sup>[10,22]</sup> 3) Automated Soxhlet Extraction, Gas Chromatographic Method <sup>[22,31]</sup> 1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[1,9,25]</sup>
18	Endrin	2) Soxhlet Extraction, Gas Chromatographic Method <sup>[10,22]</sup> 3) Automated Soxhlet Extraction, Gas Chromatographic Method <sup>[22,31]</sup> 1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[1,9,25]</sup>
19	Heptachlor	2) Soxhlet Extraction, Gas Chromatographic Method <sup>[10,22]</sup> 3) Automated Soxhlet Extraction, Gas Chromatographic Method <sup>[22,31]</sup> 1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[1,9,25]</sup>
20	Lead	2) Soxhlet Extraction, Gas Chromatographic Method <sup>[10,22]</sup> 3) Automated Soxhlet Extraction, Gas Chromatographic Method <sup>[22,31]</sup> 1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[1,6,15]</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>[1,6,16]</sup> 3) Digestion, Inductively Coupled Plasma Method <sup>[7,15]</sup> 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>[7,16]</sup>
21	Lindane	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[1,9,25]</sup> 2) Soxhlet Extraction, Gas Chromatographic Method <sup>[10,22]</sup> 3) Automated Soxhlet Extraction, Gas Chromatographic Method <sup>[22,31]</sup>
22	Mercury	1) Waste Extraction, Digestion, Cold-Vapor Atomic Absorption Spectrometric Method <sup>[1,6,18]</sup>

วิมล

2) Waste Extraction...

(นางริกาญจน์ ฉัตรสกุลวิไล)

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ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
23	Methoxychlor	2) Waste Extraction, Thermal Decomposition Amalgamation and Atomic Absorption Spectrometric Method <sup>[1,6,19]</sup> 3) Waste Extraction, Digestion, Cold-Vapor Atomic Fluorescence Spectrometric Method <sup>[1,6,20]</sup> 4) Digestion, Cold-Vapor Atomic Absorption Spectrometric Method <sup>[18]</sup> 5) Thermal Decomposition Amalgamation and Atomic Absorption Spectrometric Method <sup>[19]</sup> 6) Digestion, Cold-Vapor Atomic Fluorescence Spectrometric Method <sup>[20]</sup>
24	Mirex	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[1,9,25]</sup> 2) Soxhlet Extraction, Gas Chromatographic Method <sup>[10,22]</sup> 3) Automated Soxhlet Extraction, Gas Chromatographic Method <sup>[22,31]</sup>
25	Molybdenum	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[1,9,25]</sup> 2) Soxhlet Extraction, Gas Chromatographic Method <sup>[10,22]</sup> 3) Automated Soxhlet Extraction, Gas Chromatographic Method <sup>[22,31]</sup>
26	Nickel	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[1,6,15]</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>[1,6,16]</sup> 3) Digestion, Inductively Coupled Plasma Method <sup>[7,15]</sup> 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>[7,16]</sup>
		1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[1,6,15]</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>[1,6,16]</sup> 3) Digestion, Inductively Coupled Plasma Method <sup>[7,15]</sup> 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>[7,16]</sup>

วิมล

27 Polychlorinated...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
27	<p>Polychlorinated biphenyls (PCBs)</p> <ul style="list-style-type: none"> <li>- Aroclor 1016</li> <li>- Aroclor 1221</li> <li>- Aroclor 1232</li> <li>- Aroclor 1242</li> <li>- Aroclor 1248</li> <li>- Aroclor 1254</li> <li>- Aroclor 1260</li> <li>- 2-Chlorobiphenyl</li> <li>- 2,3-Dichlorobiphenyl</li> <li>- 2,2',5-Trichlorobiphenyl</li> <li>- 2,4',5-Trichlorobiphenyl</li> <li>- 2,2',3,5'-Tetrachlorobiphenyl</li> <li>- 2,2',5,5'-Tetrachlorobiphenyl</li> <li>- 2,3',4,4'-Tetrachlorobiphenyl</li> <li>- 2,2',3,4,5'-Pentachlorobiphenyl</li> <li>- 2,2',4,5,5'-Pentachlorobiphenyl</li> <li>- 2,3,3',4',6-Pentachlorobiphenyl</li> <li>- 2,2',3,4,4',5'-Hexachlorobiphenyl</li> <li>- 2,2',3,4,5,5'-Hexachlorobiphenyl</li> <li>- 2,2',3,5,5',6-Hexachlorobiphenyl</li> <li>- 2,2',4,4',5,5'-Hexachlorobiphenyl</li> <li>- 2,2',3,3',4,4',5-Heptachlorobiphenyl</li> <li>- 2,2',3,4,4',5,5'-Heptachlorobiphenyl</li> <li>- 2,2',3,4,4',5',6-Heptachlorobiphenyl</li> <li>- 2,2',3,4',5,5',6-Heptachlorobiphenyl</li> <li>- 2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl</li> </ul>	<p>1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method<sup>[1,9,23]</sup></p> <p>2) Soxhlet Extraction, Gas Chromatographic Method<sup>[10,23]</sup></p> <p>3) Automated Soxhlet Extraction, Gas Chromatographic Method<sup>[22,31]</sup></p>

วิมล

(นางริกาญจน์ ฉัตรสกุลวิไล)

ผู้อำนวยการกลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษ

28 Pentachlorophenol...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
28	Pentachlorophenol	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[1,9,25]</sup> 2) Soxhlet Extraction, Gas Chromatographic Method <sup>[10,22]</sup> 3) Automated Soxhlet Extraction, Gas Chromatographic Method <sup>[22,31]</sup>
29	pH	Electrometric Method <sup>[29,30]</sup>
30	Selenium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[1,6,15]</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>[1,6,16]</sup> 3) Digestion, Inductively Coupled Plasma Method <sup>[7,15]</sup> 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>[7,16]</sup>
31	Silver	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[1,6,15]</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>[1,6,16]</sup>
32	Thallium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[1,6,15]</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>[1,6,16]</sup> 3) Digestion, Inductively Coupled Plasma Method <sup>[7,15]</sup> 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>[7,16]</sup>
33	Toxaphene	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[1,9,25]</sup> 2) Soxhlet Extraction, Gas Chromatographic Method <sup>[10,22]</sup> 3) Automated Soxhlet Extraction, Gas Chromatographic Method <sup>[22,31]</sup>
34	Vanadium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[1,6,15]</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>[1,6,16]</sup> 3) Digestion, Inductively Coupled Plasma Method <sup>[7,15]</sup>

วิมล

(นางริกาญจน์ ฉัตรสกุลวิไล)

ผู้อำนวยการกลุ่มมาตรฐานวิชาการวิเคราะห์ทดสอบมลพิษ

4) Digestion...



ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
35	Zinc	4) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>[7,16]</sup> 1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[1,6,15]</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>[1,6,16]</sup> 3) Digestion, Inductively Coupled Plasma Method <sup>[7,15]</sup> 4) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>[7,16]</sup>

ดิน จำนวน 125 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Acenaphthene	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[25,31]</sup>
2	Acetone	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>[14,24]</sup>
3	Aldrin	1) Soxhlet Extraction, Gas Chromatographic Method <sup>[10,22]</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[25,31]</sup>
4	Anthracene	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[25,31]</sup>
5	Antimony	1) Digestion, Inductively Coupled Plasma Method <sup>[7,15]</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>[7,16]</sup>
6	Arsenic	1) Digestion, Inductively Coupled Plasma Method <sup>[7,15]</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>[7,16]</sup>
7	Atrazine	1) Soxhlet Extraction, Gas Chromatographic Method <sup>[10,22]</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[25,31]</sup>
8	Barium	1) Digestion, Inductively Coupled Plasma Method <sup>[7,15]</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>[7,16]</sup>

วิมล

(นางริกาณจน์ ฉัตรสกุลวิไล)

ผู้อำนวยการกลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษ

9 Benz(a)anthracene...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
9	Benz(a)anthracene	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[25,31]</sup>
10	Benzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>[14,24]</sup>
11	Benzo(b)fluoranthene	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[25,31]</sup>
12	Benzo(k)fluoranthene	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[25,31]</sup>
13	Benzoic acid	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[25,31]</sup>
14	Benzo(a)pyrene	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[25,31]</sup>
15	Benzo(g,h,i)perylene	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[25,31]</sup>
16	Beryllium	1) Digestion, Inductively Coupled Plasma Method <sup>[7,15]</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>[7,16]</sup>
17	Bis(2-chloroethyl)ether	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[25,31]</sup>
18	Bis(2-ethylhexyl)phthalate	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[25,31]</sup>
19	Bromodichloromethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>[14,24]</sup>
20	Bromoform	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>[14,24]</sup>
21	Butanol	Equilibrium Headspace, Gas Chromatographic/ Mass Spectrometric Method <sup>[12,24]</sup>
22	Butyl Benzyl Phthalate	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[25,31]</sup>
23	Cadmium	1) Digestion, Inductively Coupled Plasma Method <sup>[7,15]</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>[7,16]</sup>
24	Carbazole	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[25,31]</sup>
25	Carbon Disulfide	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>[14,24]</sup>

วิกรม

26 Carbon tetrachloride...

(นางริกาญจน์ ฉัตรสกุลวิไล)

ผู้อำนวยการกลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
26	Carbon tetrachloride	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>[14,24]</sup>
27	Chlordane	1) Soxhlet Extraction, Gas Chromatographic Method <sup>[10,22]</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[25,31]</sup>
28	p-Chloroaniline	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[25,31]</sup>
29	Chlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>[14,24]</sup>
30	Chlorodibromomethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>[14,24]</sup>
31	Chloroform	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>[14,24]</sup>
32	2-Chlorophenol	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[25,31]</sup>
33	Chromium	1) Digestion, Inductively Coupled Plasma Method <sup>[7,15]</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>[7,16]</sup>
34	Chromium (III)	1) Digestion, Inductively Coupled Plasma Method; Alkaline Digestion, Colorimetric Method; Calculation Method <sup>[7,8,15,17]</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method; Alkaline Digestion, Colorimetric Method; Calculation Method <sup>[7,8,16,17]</sup>
35	Chromium (VI)	Alkaline Digestion, Colorimetric Method <sup>[8,17]</sup>
36	Chrysene	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[25,31]</sup>
37	Cyanide	Extraction, Distillation, Colorimetric Method <sup>[26,27,28]</sup>
38	2,4-D	1) Soxhlet Extraction, Gas Chromatographic Method <sup>[10,22]</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[25,31]</sup>
39	DDD	1) Soxhlet Extraction, Gas Chromatographic Method <sup>[10,22]</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[25,31]</sup>

วิฑูรย์

(นางวิภาณูจน์ ฉัตรสกุลวิไล)

ผู้อำนวยการกลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษ

40 DDE...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
40	DDE	1) Soxhlet Extraction, Gas Chromatographic Method <sup>[10,22]</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[25,31]</sup>
41	DDT	1) Soxhlet Extraction, Gas Chromatographic Method <sup>[10,22]</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[25,31]</sup>
42	Dibenz(a,h)anthracene	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[25,31]</sup>
43	Di-n-Butyl Phthalate	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[25,31]</sup>
44	1,2-Dichlorobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[14,24]</sup>
45	1,3-Dichlorobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[14,24]</sup>
46	1,4-Dichlorobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[14,24]</sup>
47	3,3-Dichlorobenzidine	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[25,31]</sup>
48	1,1-Dichloroethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[14,24]</sup>
49	1,2-Dichloroethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[14,24]</sup>
50	1,1-Dichloroethylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[14,24]</sup>
51	cis-1,2-Dichloroethylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[14,24]</sup>
52	trans-1,2-Dichloroethylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[14,24]</sup>
53	2,4-Dichlorophenol	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[25,31]</sup>
54	1,2-Dichloropropane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[14,24]</sup>
55	1,3-Dichloropropane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[14,24]</sup>
56	1,3-Dichloropropene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[14,24]</sup>

วิภาณี

(นางริกาญจน์ ฉัตรสกุลวิไล)

57 Dieldrin...



ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
57	Dieldrin	1) Soxhlet Extraction, Gas Chromatographic Method <sup>[10,22]</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[25,31]</sup>
58	Diethyl Phthalate	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[25,31]</sup>
59	2,4-Dimethylphenol	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[25,31]</sup>
60	2,4-Dinitrophenol	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[25,31]</sup>
61	2,4-Dinitrotoluene	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[25,31]</sup>
62	2,6-Dinitrotoluene	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[25,31]</sup>
63	Di-n-Octyl Phthalate	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[25,31]</sup>
64	Endosulfan	1) Soxhlet Extraction, Gas Chromatographic Method <sup>[10,22]</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[25,31]</sup>
65	Endrin	1) Soxhlet Extraction, Gas Chromatographic Method <sup>[10,22]</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[25,31]</sup>
66	Ethylbenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[14,24]</sup>
67	Fluoranthene	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[25,31]</sup>
68	Fluorene	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[25,31]</sup>
69	Heptachlor	1) Soxhlet Extraction, Gas Chromatographic Method <sup>[10,22]</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[25,31]</sup>
70	Heptachlor Epoxide	1) Soxhlet Extraction, Gas Chromatographic Method <sup>[10,22]</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[25,31]</sup>

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
71	Hexachlorobenzene	1) Soxhlet Extraction, Gas Chromatographic Method <sup>[10,22]</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[25,31]</sup>
72	Hexachloro-1,3-butadiene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[14,24]</sup>
73	n-Hexane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[14,24]</sup>
74	$\alpha$ -HCH	1) Soxhlet Extraction, Gas Chromatographic Method <sup>[10,22]</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[25,31]</sup>
75	$\beta$ -HCH	1) Soxhlet Extraction, Gas Chromatographic Method <sup>[10,22]</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[25,31]</sup>
76	$\gamma$ -HCH	1) Soxhlet Extraction, Gas Chromatographic Method <sup>[10,22]</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[25,31]</sup>
77	Hexachlorocyclopentadiene	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[25,31]</sup>
78	Hexachloroethane	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[25,31]</sup>
79	Indeno(1,2,3-cd)pyrene	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[25,31]</sup>
80	Isophorone	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[25,31]</sup>
81	Lead	1) Digestion, Inductively Coupled Plasma Method <sup>[7,15]</sup> 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>[7,16]</sup>
82	Manganese	1) Digestion, Inductively Coupled Plasma Method <sup>[7,15]</sup> 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>[7,16]</sup>
83	Mercury	1) Digestion, Cold-Vapor Atomic Absorption Spectrometric Method <sup>[18]</sup>

วิมล

(นางริกาญจน์ ฉัตรสกุลวิไล)

ผู้อำนวยการกลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษ

และหน่วยงานบังคับใช้กฎหมาย

2) Thermal...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
84	Methanol	2) Thermal Decomposition, Amalgamation, and Atomic Absorption Spectrophotometry <sup>[19]</sup> 3) Digestion, Cold-Vapor Atomic Fluorescence Spectrometric Method <sup>[20]</sup> Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method <sup>[12,24]</sup>
85	Methoxychlor	1) Soxhlet Extraction, Gas Chromatographic Method <sup>[10,22]</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[25,31]</sup>
86	Methyl Bromide	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[14,24]</sup>
87	Methylene Chloride	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[14,24]</sup>
88	2-methylphenol	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[25,31]</sup>
89	2-Methylnaphthalene	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[25,31]</sup>
90	Methyl tert-Butyl Ether	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[14,24]</sup>
91	Naphthalene	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[25,31]</sup>
92	Nickel	1) Digestion, Inductively Coupled Plasma Method <sup>[7,15]</sup> 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>[7,16]</sup>
93	Nitrobenzene	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[25,31]</sup>
94	N-Nitrosodiphenylamine	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[25,31]</sup>
95	N-Nitrosodi-n-propylamine	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[25,31]</sup>
96	Polychlorinated biphenyls (PCBs) - Aroclor 1016 - Aroclor 1221 - Aroclor 1232	1) Soxhlet Extraction, Gas Chromatographic Method <sup>[10,23]</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic Method <sup>[23,32]</sup>

วิฑูรย์

(นางริกาญจน์ ฉัตรสกุลวิไล)

- Aroclor 1242...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
	<ul style="list-style-type: none"> <li>- Aroclor 1242</li> <li>- Aroclor 1248</li> <li>- Aroclor 1254</li> <li>- Aroclor 1260</li> <li>- 2-Chlorobiphenyl</li> <li>- 2,2',3,5'-Tetrachlorobiphenyl</li> <li>- 2,2',5,5'-Tetrachlorobiphenyl</li> <li>- 2,3',4,4'-Tetrachlorobiphenyl</li> <li>- 2,2',3,4,5'-Pentachlorobiphenyl</li> <li>- 2,2',4,5,5'-Pentachlorobiphenyl</li> <li>- 2,3,3',4',6-Pentachlorobiphenyl</li> <li>- 2,2',3,4,4',5'-Hexachlorobiphenyl</li> <li>- 2,2',3,4,5,5'-Hexachlorobiphenyl</li> <li>- 2,2',3,5,5',6-Hexachlorobiphenyl</li> <li>- 2,2',4,4',5,5'-Hexachlorobiphenyl</li> <li>- 2,2',3,3',4,4',5-Heptachlorobiphenyl</li> <li>- 2,2',3,4,4',5,5'-Heptachlorobiphenyl</li> <li>- 2,2',3,4,4',5',6-Heptachlorobiphenyl</li> <li>- 2,2',3,4',5,5',6-Heptachlorobiphenyl</li> <li>- 2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl</li> </ul>	
97	Pentachlorophenol	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[25,31]</sup>
98	Phenanthrene	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[25,31]</sup>
99	Phenol	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[25,31]</sup>
100	Pyrene	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[25,31]</sup>

วิกรม

(นางริกาญจน์ ฉัตรสกุลวิไล)

ผู้อำนวยการกลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษ  
และทะเบียนห้องปฏิบัติการ

101 Selenium...



ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
101	Selenium	1) Digestion, Inductively Coupled Plasma Method <sup>[7,15]</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>[7,16]</sup>
102	Silver	1) Digestion, Inductively Coupled Plasma Method <sup>[7,15]</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>[7,16]</sup>
103	Styrene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>[14,24]</sup>
104	1,1,2,2-Tetrachloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>[14,24]</sup>
105	Tetrachloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>[14,24]</sup>
106	Toluene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>[14,24]</sup>
107	Toxaphene	1) Soxhlet Extraction, Gas Chromatographic Method <sup>[10,22]</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[25,31]</sup>
108	TPH (C <sub>5</sub> -C <sub>8</sub> )	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>[14,24]</sup>
109	TPH (C <sub>8</sub> - C <sub>16</sub> )	1) Solvent Extraction, Gas Chromatographic Method <sup>[11,21]</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic Method <sup>[21,31]</sup>
110	TPH (C <sub>16</sub> - C <sub>35</sub> )	1) Solvent Extraction, Gas Chromatographic Method <sup>[11,21]</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic Method <sup>[21,31]</sup>
111	1,2,4-Trichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>[14,24]</sup>
112	1,1,1-Trichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>[14,24]</sup>
113	1,1,2-Trichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>[14,24]</sup>
114	Trichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>[14,24]</sup>
115	2,4,5-Trichlorophenol	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[25,31]</sup>

วิมล

116 2,4,6-Trichlorophenol...

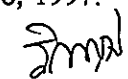
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ผู้อำนวยการกลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
116	2,4,6-Trichlorophenol	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[25,31]</sup>
117	1,3,5-Trimethylbenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>[14,24]</sup>
118	Vanadium	1) Digestion, Inductively Coupled Plasma Method <sup>[7,15]</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>[7,16]</sup>
119	Vinyl Acetate	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>[14,24]</sup>
120	Vinyl Chloride	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>[14,24]</sup>
121	m-Xylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>[14,24]</sup>
122	o-Xylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>[14,24]</sup>
123	p-Xylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>[14,24]</sup>
124	Xylene (Total)	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>[14,24]</sup>
125	Zinc	1) Digestion, Inductively Coupled Plasma Method <sup>[7,15]</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>[7,16]</sup>

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