

ภาคผนวก ข-1

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ผลการสำรวจสภาพเศรษฐกิจสังคม และความคิดเห็น ของประชาชน  
ผู้นำชุมชน ผู้นำท้องถิ่นและตัวแทนหน่วยงาน

## รายงานผลการศึกษาลักษณะทางภูมิสังคม และความสัมพันธ์ของประชาชน โครงการโรงไฟฟ้าชีวมวลชุมชนแอ่งน้ำจืด 9.9 แมกะวิสัย (ระยะดำเนินการ) ของวิสัย ชุมชนแอ่งน้ำจืด อำเภอเมือง จังหวัด เชียงใหม่ ปี 2565

### 1. ขอบเขตและวิธีการศึกษา

การติดตามตรวจสอบผลกระทบด้านเศรษฐกิจ-สังคม และความสัมพันธ์ของประชาชน ของโรงไฟฟ้าชีวมวลขนาด  
กำลังการผลิต 9.9 แมกะวิสัย (ระยะดำเนินการ) ของวิสัย ชุมชนแอ่งน้ำจืด อำเภอเมือง จังหวัด เชียงใหม่ ได้ดำเนินการติดตามตรวจสอบผลกระทบ  
สิ่งแวดล้อม ในระยะดำเนินการ มีวัตถุประสงค์เพื่อให้เห็นภาพได้ชัดเจนว่าผลกระทบด้านสิ่งแวดล้อมที่เกิดขึ้นจริงหรือไม่ และหากมีผลกระทบ  
ทางกายภาพ ปัญหา หรือการปรับปรุงมาตรการป้องกัน และแก้ไขผลกระทบในด้านต่างๆ ซึ่งจะเป็นประโยชน์สำหรับการ  
วิเคราะห์และประเมินผล หรือมีแนวโน้มการเกิดผลกระทบด้านสุขภาพของประชาชน โดยวิธีการในการติดตามตรวจสอบ  
ผลกระทบด้านเศรษฐกิจ-สังคม และความคิดเห็น ด้วยการสำรวจข้อมูลและทัศนคติ โดยใช้วิธีการแบบสอบถามกลุ่มเป้าหมาย  
เป็นหน่วยของการศึกษา ผู้มีชุมชน และประชาชนในบริเวณที่มีกำลังเสียงร้องทุกข์ ปีละ 1 ครั้ง ตั้งในปี 2565 ได้ดำเนินการ  
ในช่วงระหว่างวันที่ 16 - 20 พฤษภาคม พ.ศ. 2565

#### 1.1 วัตถุประสงค์

การติดตามตรวจสอบผลกระทบด้านเศรษฐกิจ-สังคม และความคิดเห็นของประชาชน โรงไฟฟ้าชีวมวล ชุมชน  
แอ่งน้ำจืด 9.9 แมกะวิสัย (ระยะดำเนินการ) ของวิสัย ชุมชนแอ่งน้ำจืด อำเภอเมือง จังหวัด เชียงใหม่ มีวัตถุประสงค์ดังต่อไปนี้

- 1) เพื่อศึกษาลักษณะทางเศรษฐกิจ สังคม สุขภาพอนามัย สาธารณูปโภค/สาธารณูปการ การประกอบอาชีพ และ  
ความเป็นอยู่ของชุมชน
- 2) เพื่อรับทราบปัญหาเกี่ยวกับสภาพแวดล้อม และสังคมในปัจจุบันที่ส่งผลกระทบต่อทางด้านสุขภาพ การประกอบอาชีพ และ  
ในชุมชน
- 3) เพื่อสำรวจการรับรู้ข้อมูลข่าวสาร เกี่ยวกับการดำเนินงานของโรงไฟฟ้าชีวมวลขนาดกำลังการผลิต 9.9 แมกะ  
วิสัย (ระยะดำเนินการ) ของวิสัย ชุมชนแอ่งน้ำจืด อำเภอเมือง จังหวัด เชียงใหม่
- 4) เพื่อทราบผลกระทบด้านสิ่งแวดล้อม ที่ประชาชนได้รับจากการดำเนินงานของโรงไฟฟ้าชีวมวลขนาดกำลังการผลิต 9.9 แมกะ  
วิสัย
- 5) เพื่อทราบทัศนคติของประชาชนต่อการดำเนินงานของโรงไฟฟ้าชีวมวลขนาดกำลังการผลิตในปัจจุบัน และ  
ข้อเสนอแนะในด้านต่างๆ

#### 1.2 ขอบเขตการดำเนินงานพื้นที่ศึกษา

การติดตามตรวจสอบผลกระทบด้านเศรษฐกิจ-สังคม ตามมาตรการป้องกันและแก้ไขผลกระทบสิ่งแวดล้อม  
ของโรงงาน จะดำเนินการสำรวจความคิดเห็นของชุมชนเป้าหมาย ที่ระบุด้วยมาตรการของโรงไฟฟ้าชีวมวลขนาดกำลังการผลิต  
ผลิต 9.9 แมกะวิสัย (ระยะดำเนินการ) ของวิสัย ชุมชนแอ่งน้ำจืด อำเภอเมือง จังหวัด เชียงใหม่ โดยทำการศึกษาชุมชนที่อยู่ใกล้เคียงโรงงานมา ใน  
รัศมี 5 กิโลเมตร รวม 15 หมู่บ้าน แสดงดังรูปที่ 1



รูปที่ 1 ขอบเขตพื้นที่ศึกษารัศมี 5 กิโลเมตร รอบพื้นที่โรงงาน

### 1.3 วิธีการทำนิมงาน

### 1.3.1 กล้องเฝ้าภาพ

กลุ่มเป้าหมายที่ระบุไว้มาจากการติดตามตรวจสอบเอกสารเชิงแหล่งข้อมูลของโรงเรียนเพื่อหาขนาดกำลัง  
 ภาษาอังกฤษ ๑๐ คณะจัด (ระยะต้นเป็นกลาง) ของโรงเรียน ก้าวไปสู่ผลิตไฟฟ้า จำหน่าย มีดังนี้

- [illegible]

[illegible]

- ประกอบขึ้น ด้านที่พลาด คือสภาพของ อู่ยามูน่าโมโม่ จึงเกิดอุบัติเหตุ และทำให้การสำรวจของ อู่ยามูน่าโมโม่ ไม่สามารถดำเนินการได้ตามแผนที่วางไว้
- ข้อสังเกตและข้อเสนอแนะที่ได้จากข้อมูลเบื้องต้นที่ปรากฏ ดังนี้ 5 ข้อได้แก่
1. การขาดการสนับสนุนจากหน่วยงานที่เกี่ยวข้อง
  2. การขาดการสนับสนุนจากหน่วยงานที่เกี่ยวข้อง
  3. การขาดการสนับสนุนจากหน่วยงานที่เกี่ยวข้อง
  4. การขาดการสนับสนุนจากหน่วยงานที่เกี่ยวข้อง
  5. การขาดการสนับสนุนจากหน่วยงานที่เกี่ยวข้อง

$\mathbb{Z}$

$$u = \frac{N}{1 + N(\phi)^2}$$

เมื่อ  $n = 1$   $\Rightarrow$   $1 \leq n \leq 1$

$$\frac{50,000}{100,000} = 0.5$$

ความคลาดเคลื่อนที่ยอมรับได้ในระดับ 0.05

จากเนตาของประชากรครั้งนี้ มีจำนวน 3,204 คนหรือเกือบ 1 เปอร์เซ็นต์ของกลุ่มตัวอย่าง จากสูตรดังกล่าว

$$= \frac{5,204}{1 + 3,204(0.05)^2}$$

Item	Unit	Price	Quantity	Total
1.000	kg	355.6	370	

หลังนี้ เมื่อคำนวณค่าสัดส่วนของผลคูณด้วยค่าร้อยละรวมหมู่บ้าน/ชุมชน ตามของผลคูณด้วยค่าร้อยละที่คำนวณได้ดังนี้ คือ 356 ราย ซึ่งผลคูณด้วยค่าร้อยละที่ใช้เป็นหน่วยคำนวณจากค่าร้อยละที่คำนวณได้ในการสำรวจจากชุมชนบริษัทที่ปรึกษาได้ดำเนินการสำรวจตามพื้นที่และข้อมูลแบบประจําหมู่บ้านที่ยังต้องรอสรุปพื้นที่ที่สำรวจ จำนวน 359 ราย ผู้ใหญ่ชุมชน จำนวน 15 ราย และหน่วยงานราชการ จำนวน 29 ราย รวมทั้งสิ้น จำนวน 403 ราย สรุปได้คือความถี่ 1

ตารางที่ 1 ขนาดตัวอย่างของการสำรวจข้อมูลแบบสองทางตัดกัน (ครว้างเวียน)

ชื่อผู้คิด	บ้านน้อย	ตัวบ่ง	ข้อมูลบ้าน	จำนวนเด็กโรงเรียน	จำนวนบ้านหรือที่พักอาศัย
<b>ชนิดที่ 0-3 กิโลเมตร (ชุมชนที่อยู่ใกล้พื้นที่โครงการ)</b>					
จุดสถานี	บ้านไร่	พื้นที่หลวง	หมู่ที่ 2 บ้านพิงค์น้อย	257	29
			หมู่ที่ 12 บ้านเค็ดทอง	690	77
			หมู่ที่ 13 บ้านป่าแดง	96	11
			<b>ชนิดที่ 3-5 กิโลเมตร (ชุมชนที่อยู่ใกล้พื้นที่โครงการ)</b>		
			หมู่ที่ 3 บ้านกัทโหลน	233	26
จุดสถานี	บ้านไร่	โคกตะกวด	หมู่ที่ 4 บ้านใหม่หนองแวก	291	33
			หมู่ที่ 5 บ้านสวนพริก	194	22
			หมู่ที่ 6 บ้านเก้งนา	210	23
			หมู่ที่ 8 บ้านเจียงน	68	8
			หมู่ที่ 9 บ้านป่าบัว	132	15
		หนองจอก	หมู่ที่ 15 บ้านต้อ	135	15
			หมู่ที่ 3 บ้านหนองไม้แก่น	145	16
			หมู่ที่ 5 บ้านจัน	177	20
			หมู่ที่ 7 บ้านหนองไม้ตาย	118	13
			หมู่ที่ 2 บ้านหนองเขาเงิน	259	29
สาธารณูปโภค	ด้านไฟฟ้า	จุดพื้น	หมู่ที่ 3 บ้านกัทโหลน	199	22
ตัวบ้านเลข 15 หมู่บ้าน / ถนน / ถนน				-	15
หน่วยงานราชการ / พื้นที่ของบ้าน				-	19
รวม				3,204	403

### 1.3.2 วิธีการร่วมด้วยช่วยกัน

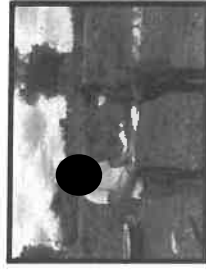
บริษัทที่ปรึกษาได้ดำเนินการสอบถามพนักงานห้องครัวเกี่ยวกับงานบริหารที่เกี่ยวข้องโดยตรงที่เขากำลังทำ และการตอบกลับที่คาดหวังได้ถูกนำมาใช้ โดยการศึกษาปัญหานี้สามารถทำได้ในเชิงพื้นที่ (เฉพาะงาน/ หน่วยงาน) หรือในเชิงตัวบุคคล (เฉพาะพนักงาน) โดยที่นักวิจัยได้ทำการสัมภาษณ์กับพนักงานห้องครัวและผู้จัดการครัวที่สำนักงานของบริษัทที่ปรึกษาที่เขากำลังทำอยู่ โดยตรงทั้งหมด ทั้ง 15 คน ดังนั้นจึงมีเพียงคนกรอกข้อมูลเท่านั้นที่ตอบกลับ และข้อมูลที่ได้มานั้นเป็นประโยชน์อย่างมากต่อทั้งบริษัทที่ปรึกษาและผู้ให้บริการ (Simple Random Sampling) และการเลือกตัวอย่างแบบไม่แทนที่ (Sampling without Replacement) หมายถึง ตัวอย่างที่ถูกเลือกไปแล้วจะไม่ถูกเลือกอีกครั้งในครั้งต่อไป (ซึ่งการสุ่มตัวอย่างแบบไม่แทนที่นี้ใช้วิธีการสุ่มตัวอย่างแบบง่าย) เพื่อให้มีความรู้ความเข้าใจเกี่ยวกับปริมาณและชนิดของแรงงาน กองการลงพื้นที่และผู้ให้บริการที่มีส่วนเกี่ยวข้องกับการปฏิบัติงาน เพื่อให้ได้มาซึ่งความรู้

### 1.3.3 การเก็บข้อมูลภาคสนาม

บริษัทที่ปรึกษาได้ดำเนินการสอบทานพื้นที่ลัดคิวด้วยหน่วยงานราชการที่เกี่ยวข้องโดยรอบพื้นที่โรงงาน  
ในเชิงสืบสวนภูมิทัศน์ และการประเมินพื้นที่ลัดคิวที่หน่วยงานราชการ ใกล้เคียง พัด และผู้ชำนาญ รวมถึงการสอบถาม  
ความคิดเห็นของประชาชนที่เกี่ยวข้องโดยรอบพื้นที่โรงงาน ทั้ง 15 หมู่บ้าน ได้ดำเนินการสำรวจภาคสนามระหว่าง  
วันที่ 16-20 พฤษภาคม พ.ศ. 2565 ดังรูปที่ 2 ถึงรูปที่ 3



รูปที่ 2 ประมวลภาพการสำรวจความคิดเห็นหน่วยงาน โรงเรียน วัด และผู้กำกับชนบท ตามแผนการติดตามสภาพเศรษฐกิจ-สังคม ระหว่างวันที่ 16-20 พฤษภาคม พ.ศ. 2565



รูปที่ 3 ประมวลภาพการสำรวจความพึงพอใจของประชาชนแผนการติดตามสภาพเศรษฐกิจสังคม ระหว่างวันที่ 16-20 พฤษภาคม พ.ศ. 2565

#### 1.3.4 รายละเอียดของแบบสอบถาม

แบบสอบถามที่ใช้สำรวจความคิดเห็น แบ่งเป็น 2 แบบ คือ แบบสอบถามความคิดเห็นของหน่วยงานราชการ และแบบสอบถามความคิดเห็นของผู้ให้ทุนแต่ละประชาคม โดยมีการกำหนดกรอบของเนื้อหาและความเหมาะสมต่อกลุ่มตัวอย่าง ซึ่งมีโครงสร้างที่ครอบคลุมตามประเด็นสำคัญ (รายละเอียดของแบบสอบถาม ก) ดังนี้

แบบสอบถามความคิดเห็นหน่วยงานราชการ วัด และผู้นำชุมชน

- ส่วนที่ 1 ข้อมูลสถานะแวดล้อมปัจจุบันของพื้นที่โดยรวม
- ส่วนที่ 2 การรับทราบข้อมูลจากสหประชาชาติ
- ส่วนที่ 3 ทัศนคติและความคิดเห็นเกี่ยวกับโรงงาน
- ส่วนที่ 4 ข้อเสนอแนะและข้อคิดเห็นต่อการทำงานในโครงการ

### แบบสอบถามความคิดเห็นของประชาชน

- ส่วนที่ 1 ข้อมูลทั่วไป และสภาพเศรษฐกิจ-สังคมผู้ตอบแบบสอบถาม
- ส่วนที่ 2 นวัตกรรมสื่อออนไลน์ของผู้ชมในปัจจุบัน
- ส่วนที่ 3 การบริหารข้อมูลข่าวสารทางอินเทอร์เน็ต
- ส่วนที่ 4 ทัศนคติและความคิดเห็นเกี่ยวกับโครงการสื่อนวัตกรรม
- ส่วนที่ 5 ข้อเสนอแนะและข้อคิดเห็นต่อการดำเนินงานโครงการ







2. กิจกรรมเพื่อการพัฒนาเรียนรู้เชิงพื้นที่  
และวัดระดับความพึงพอใจระดับได้ ร้อยละ 27 และระดับความพึงพอใจระดับพอใช้ ร้อยละ 13.8

3. กิจกรรมเกี่ยวกับแหล่งเรียนรู้การสืบค้น พบว่า ผู้ตอบแบบสอบถามมีความพึงพอใจในระดับปานกลาง ร้อยละ 48.3 รองลงมาคือความพึงพอใจในระดับสูง ร้อยละ 20.7 และระดับความพึงพอใจในระดับต่ำ ร้อยละ 17.2

4. โครงแบบเกี่ยวกับการพัฒนาความยั่งยืนสิ่งแวดล้อม พบว่า ผู้ตอบแบบสอบถามทั้งหมดมีความเห็นที่จะปรับปรุงและ 44.8 ของคนไม่รวมเห็นที่จะปรับปรุงและ 27.6 และระดับความเห็นต่อใจที่จะปรับปรุงและ 13.8 ระดับต่อใจ เห็นด้วย 13.8

5. กิจกรรมที่เกี่ยวข้องกับงานส่งเสริมสุขภาพ วัดตามแบบสอบถามซึ่งหาความพึงพอใจระดับปานกลาง ร้อยละ 51.7 ของแผนกวิเทศทูตแห่งพิธีจะต๊ะได้ ร้อยละ 24.1 และเรียนรู้ความพึงพอใจระดับดีมาก ร้อยละ 17.2

6. กิจกรรมการประชาสัมพันธ์และเผยแพร่ผลงานทั้งในและนอกมหาวิทยาลัย  
ระดับปานกลาง ร้อยละ 51.7 รองลงมาเกี่ยวกับความพึงพอใจต่อร้อยละ 27.7 และระดับความพึงพอใจในระดับดีมาก ระดับความพึงพอใจร้อยละ 10.3

ข้อเสียของแบบประเมินนี้ก็คือมันให้ข้อมูลราคาเป็นวงกว้างของโรงงาน

ข้อมูลเฉพาะหรือข้อคิดเห็นอื่นๆ ต่อโครงการ พบว่า ผู้ตอบแบบสอบถามมีความคิดเห็นเพิ่มเติม ดังนี้

1. ช่วยกันดูแล ตรวจสอบ และเรียบเรียงการเข้าทำเรื่องขึ้นเรียนต่อชั้นที่ตนเองสนใจ การทำเรื่องนี้ขึ้นและของ กลั่น
2. ประสานความร่วมมือกันทั้งโรงเรียนการติดต่อไปยังผู้เกี่ยวข้องทางราชการให้ชัดเจน
3. ช่วยดูแล ความพร้อมข้อใดก็ตามเรื่องรถบรรทุก
4. เชิญการประชุมร่วมกันให้ชัดเจน และการลงพื้นที่และพาแม่ไปกับประชาชนอย่างเต็มที่
5. เมื่อได้พิจารณาการให้ทุนผู้ไปประชุมและทำรายงานมาทางบ้านหรือโรงเรียนอีก
6. สนับสนุนกิจกรรมทางบ้านขึ้น และทำกิจกรรมร่วมกันชุมชนให้ครอบคลุมทุกพื้นที่ขึ้นทั้ง
7. สนับสนุนงบประมาณส่งเสริมชุมชน
8. สนับสนุนงบประมาณในการพัฒนาสาธารณูปโภค



1. การเข้าร่วมและสนับสนุนงบประมาณโรงเรียน และกิจกรรมทางศาสนา พบว่า ผู้ตอบแบบสอบถามทั้งหมด  
รับทราบกิจกรรม ร้อยละ 100.0

2. การสนับสนุนงบประมาณร่วมโรงเรียน เช่น ทุนการศึกษา พบว่า การสนับสนุนกิจกรรมบางอย่าง เช่น  
ทุนการศึกษา พบว่า ผู้ตอบแบบสอบถามส่วนใหญ่รับทราบกิจกรรม ร้อยละ 86.7

3. การสนับสนุนงบประมาณหรือการรับเสียกรณีเจ็บป่วยหรือเสียชีวิต พบว่า ผู้ตอบแบบสอบถามส่วนใหญ่  
รับทราบกิจกรรม ร้อยละ 73.3

4. การสนับสนุนหน่วยแพทย์เคลื่อนที่ หรือหน่วยพยาบาล กรณีเจ็บป่วย พบว่า ผู้ตอบแบบสอบถาม  
ส่วนใหญ่รับทราบกิจกรรม ร้อยละ 53.3

5. การสนับสนุนและช่วยเหลืออื่น ๆ พบว่า ผู้ตอบแบบสอบถามส่วนใหญ่รับทราบกิจกรรม ร้อยละ 53.3

6. การรับเงินช่วยเหลืออื่น ๆ พบว่า ผู้ตอบแบบสอบถามส่วนใหญ่รับทราบกิจกรรม ร้อยละ 26.7

7. การสนับสนุนอื่น ๆ พบว่า ผู้ตอบแบบสอบถามส่วนใหญ่รับทราบกิจกรรม ร้อยละ 80.0

ทั้งนี้ โดยผู้ตอบแบบสอบถามที่ตอบรับทราบกิจกรรมให้ข้อเสนอแนะเพิ่มเติม ได้แก่ การจัดการให้ทำสิ่ง  
ทุกชุมชน เมื่อสอบถามเกี่ยวกับกิจกรรมส่งเสริมการมีส่วนร่วมฯ ที่ทางโรงเรียนขอจัดกิจกรรม 9.9 เมกะวัตต์  
(ระยะดำเนินการ) ของบริษัท บ้านไม่คิดไฟฟ้า จำกัด ได้จัดตั้งปี พ.ศ. 2565 ที่ผู้ตอบแบบสอบถามประสงค์จะเพิ่มและเห็นว่าเป็น  
ประโยชน์ต่อชุมชนและชุมชน โดยกิจกรรมที่คิดว่าการเพิ่มเติม ได้แก่ สนับสนุนทุนการศึกษาอย่างต่อเนื่อง อาทิ ค่าอาหาร  
กลางวันสำหรับนักเรียน มอบทุนการศึกษา อุปกรณ์กีฬา อุปกรณ์การโยน เป็นต้น สนับสนุนกิจกรรมร่วมกับทางชุมชน  
อย่าทำให้โครงการ ส่งเสริมกิจกรรมทางศาสนาและประเพณีต่างๆ ไม่มากนัก ควรมีกิจกรรมด้านการพัฒนาอาชีพสำหรับเรา  
และมีการร่วมกันตรวจสอบการดำเนินงานเพิ่มเติม สนับสนุนหน่วยแพทย์เคลื่อนที่หรือหน่วยพยาบาลชุมชน เป็นต้น

ทัศนคติและความพึงพอใจที่มีต่อการดำเนินงาน

จากการศึกษาทัศนคติและความพึงพอใจต่อการดำเนินงานโครงการดำเนินการของโรงเรียน ตลอดจนประสิทธิภาพและคุณภาพ  
ในด้านต่างๆ ผู้ตอบแบบสอบถามส่วนใหญ่มีความพึงพอใจต่อการดำเนินงานโครงการ 9.9 เมกะวัตต์ ร้อยละ  
ค่าเป็นกลาง) ของบริษัท บ้านไม่คิดไฟฟ้า จำกัด มีทั้งผลดีและผลเสียต่อชุมชน โดยพบว่า ด้านผลกระทบเชิงบวก ชุมชน  
แบบสอบถามส่วนใหญ่ มีความพึงพอใจต่อการดำเนินการของโรงเรียน ช่วยส่งเสริมการจ้างงานภายในชุมชนมากขึ้น ร้อยละ  
100.0 รองลงมาส่งผลให้เกิดการกระจาย/กระจายรายได้ในชุมชน และทำให้ชุมชนมีความสุขมากขึ้น ร้อยละ 93.3 ระบบ  
สุขภาพที่ดีขึ้น ชุมชน และความปลอดภัยในชีวิตและทรัพย์สินเพิ่มขึ้น ร้อยละ 86.7 ส่วนความพึงพอใจในด้านการจัดหา  
สิ่งอำนวยความสะดวกในชุมชน ร้อยละ 33.3 รองลงมา ผลกระทบด้านผู้ละเมิด ลักษณะผู้ละเมิดทางเพศ/เรย์ ร้อยละ 33.3 มี  
ผลกระทบในระดับน้อย ร้อยละ 26.7 ส่วนด้านผลกระทบด้านความสะอาดในการเดินทาง/จราจรด้าน ร้อยละ  
26.7 มีผลกระทบในระดับน้อย ร้อยละ 26.7 ตามลำดับ ส่วนความคิดเห็นประโยชน์ๆ สามารถชี้แจงตามความระดับ  
ความรุนแรงในแต่ละประเด็น มีตารางที่ 6

ตารางที่ 6 ทัศนคติและความพึงพอใจที่มีต่อการดำเนินงานของโรงเรียนที่มีผลกระทบต่อคุณภาพชีวิตของชุมชน  
ในชุมชน อำเภอเมืองโคราชตามระดับความรุนแรงในแต่ละประเด็น

ผลกระทบจากการดำเนินงาน	การได้รับผลกระทบ (ร้อยละ)		
	ไม่ได้รับ	ได้รับ	ไม่ได้รับผลกระทบ
ผลกระทบทางสังคม			
1) การจ้างงานในชุมชน	0.0	100.0	0.0
2) เศรษฐกิจ/การค้าขาย	6.7	93.3	0.0
3) ระบบสาธารณสุขในชุมชน	13.3	86.7	0.0
4) ความปลอดภัยในชีวิตและทรัพย์สิน	13.3	86.7	0.0
5) ความสุข	6.7	93.3	0.0
ผลกระทบสิ่งแวดล้อม			
6) ความสะอาดไม่เกิดมลพิษอื่น	100.0	0.0	0.0
7) ความถี่ในการตรวจสอบสิ่งแวดล้อม	100.0	0.0	0.0
8) ความสะอาดในการเดินทาง/จราจร	73.3	26.7	0.0
9) ระบบสาธารณสุขในชุมชน	93.3	6.7	0.0
10) ความพึงพอใจในการจัดการขยะ	100.0	0.0	0.0
11) อุบัติเหตุ	100.0	0.0	0.0
12) โรคติดต่อ	100.0	0.0	0.0
13) ปัญหาจากมลพิษของโครงการ	93.3	6.7	0.0
14) งบประมาณของโครงการในชุมชน	93.3	6.7	0.0
15) ขยะจากโรงงานที่สร้างมลพิษในชุมชน	100.0	0.0	0.0
16) เสียงดังรบกวนจากโครงการ	100.0	0.0	0.0
17) ทัศนคติและการยอมรับในชุมชนที่มีต่อการจัดการ	100.0	0.0	0.0
18) ผลกระทบด้านผู้ละเมิด	93.3	6.7	0.0
18.1 ผู้ละเมิดทางเพศ	66.7	33.3	6.6
18.2 ผู้ละเมิดทางเพศ			26.7

ผลการดำเนินงานตามแผน	การได้รับผลกระทบ (ร้อยละ)		
	ไม่ได้รับ	ได้รับ	ได้รับผลกระทบ
18.3 ควบคุม/ดูแล	93.3	6.7	0.0
18.4 ฟื้นฟู/ดูแล	100.0	0.0	0.0
19) ผลกระทบด้านสิ่งแวดล้อม			
19.1 มาตรการป้องกัน	100.0	0.0	0.0
19.2 ฟื้นฟู/ดูแล/ป้องกัน	33.3	66.7	26.7

เมื่อสอบถามถึงผลกระทบที่เกิดจากการดำเนินงานที่โรงเรียนสาธิตมหาวิทยาลัยราชภัฏวชิรเวศน์ จังหวัดบุรีรัมย์ พบว่า ผู้ตอบแบบสอบถามทั้งหมด 100.0 ร้อยละ 100.0

เมื่อสอบถามถึงเรื่องเรียนเกี่ยวกับปัญหาจากการดำเนินงานของโรงเรียน พบว่า ผู้ตอบแบบสอบถามทั้งหมด 100.0 ร้อยละ 100.0

ตารางที่ 7 ความพึงพอใจต่อการปฏิบัติงานของโรงเรียนสาธิตมหาวิทยาลัยราชภัฏวชิรเวศน์ จังหวัดบุรีรัมย์ ปี 2565

ผลการดำเนินงานตามแผน	ระดับความพึงพอใจ (ร้อยละ)			
	ดีมาก	ดี	ปานกลาง	พอใช้
1) กิจกรรมการเรียนการสอน	0.0	53.3	26.7	20.0
2) กิจกรรมการบริการ	0.0	46.6	26.7	26.7
3) กิจกรรมการส่งเสริมการเรียนรู้	0.0	60.0	13.3	26.7
4) กิจกรรมการส่งเสริมการเรียนรู้	0.0	66.7	13.3	20.0
5) กิจกรรมการส่งเสริมการเรียนรู้	0.0	53.3	20.0	26.7
6) กิจกรรมการส่งเสริมการเรียนรู้	0.0	53.3	26.7	20.0

ความพึงพอใจต่อการปฏิบัติงานของโรงเรียนสาธิตมหาวิทยาลัยราชภัฏวชิรเวศน์ จังหวัดบุรีรัมย์ ปี 2565 ที่ผ่านมา จากการสำรวจความพึงพอใจต่อการปฏิบัติงานของโรงเรียนสาธิตมหาวิทยาลัยราชภัฏวชิรเวศน์ จังหวัดบุรีรัมย์ ปี 2565 ที่ผ่านมา ของชุมชนองค์กรปกครองส่วนท้องถิ่น ดังนี้

1. กิจกรรมการเรียนการสอน พบว่า ผู้ตอบแบบสอบถามมีความพึงพอใจในระดับดี ร้อยละ 53.3 ร้อยละ 26.7 ความพึงพอใจในระดับดี ร้อยละ 26.7 และในระดับดี ร้อยละ 20.0
2. กิจกรรมการบริการ พบว่า ผู้ตอบแบบสอบถามมีความพึงพอใจในระดับดี ร้อยละ 46.6 ร้อยละ 26.7 ความพึงพอใจในระดับดี ร้อยละ 26.7 และในระดับดี ร้อยละ 20.0
3. กิจกรรมการส่งเสริมการเรียนรู้ พบว่า ผู้ตอบแบบสอบถามมีความพึงพอใจในระดับดี ร้อยละ 60.0 ร้อยละ 26.7 ความพึงพอใจในระดับดี ร้อยละ 26.7 และในระดับดี ร้อยละ 20.0
4. กิจกรรมการส่งเสริมการเรียนรู้ พบว่า ผู้ตอบแบบสอบถามมีความพึงพอใจในระดับดี ร้อยละ 66.7 ร้อยละ 26.7 และในระดับดี ร้อยละ 20.0
5. กิจกรรมการส่งเสริมการเรียนรู้ พบว่า ผู้ตอบแบบสอบถามมีความพึงพอใจในระดับดี ร้อยละ 53.3 ร้อยละ 26.7 และในระดับดี ร้อยละ 20.0
6. กิจกรรมการส่งเสริมการเรียนรู้ พบว่า ผู้ตอบแบบสอบถามมีความพึงพอใจในระดับดี ร้อยละ 53.3 ร้อยละ 26.7 และในระดับดี ร้อยละ 20.0

### ข้อเสนอแนะและข้อคิดเห็นของโรงเรียน

ผู้ตอบแบบสอบถามมีความคิดเห็นว่า ปัจจุบันโรงเรียนสาธิตมหาวิทยาลัยราชภัฏวชิรเวศน์ จังหวัดบุรีรัมย์ มีความพึงพอใจในระดับดี ร้อยละ 53.3 ร้อยละ 26.7 และในระดับดี ร้อยละ 20.0

ด้านการเรียนการสอน ผู้ตอบแบบสอบถามมีความคิดเห็นว่า โดยมีการกำหนดมาตรฐานการเรียนรู้ในระดับดี ร้อยละ 53.3 ร้อยละ 26.7 และในระดับดี ร้อยละ 20.0

ด้านการบริการ ผู้ตอบแบบสอบถามมีความคิดเห็นว่า โดยมีการกำหนดมาตรฐานการเรียนรู้ในระดับดี ร้อยละ 53.3 ร้อยละ 26.7 และในระดับดี ร้อยละ 20.0

ด้านการส่งเสริมการเรียนรู้ ผู้ตอบแบบสอบถามมีความคิดเห็นว่า โดยมีการกำหนดมาตรฐานการเรียนรู้ในระดับดี ร้อยละ 53.3 ร้อยละ 26.7 และในระดับดี ร้อยละ 20.0

ด้านการส่งเสริมการเรียนรู้ ผู้ตอบแบบสอบถามมีความคิดเห็นว่า โดยมีการกำหนดมาตรฐานการเรียนรู้ในระดับดี ร้อยละ 53.3 ร้อยละ 26.7 และในระดับดี ร้อยละ 20.0

### 2.3 ผลสำรวจความคิดเห็นของประชาชน

ผลสำรวจความคิดเห็นของประชาชนในครั้งที่ 5 กิโลเมตร บริเวณโดยรอบโรงเรียน จำนวน 15 หมู่บ้าน  
ประกอบด้วย ตำบลโพธิ์ทอง ตำบลหนองจาน ตำบลบ้านไร่ จังหวัดบุรีรัมย์ และตำบลบ้านไร่ ตำบลบ้านไร่ จังหวัดบุรีรัมย์ โดยทั้งนี้เป็นการสำรวจความคิดเห็น จำนวน 359 ตัวอย่าง และสรุปผลดังนี้

#### ข้อมูลทั่วไปของผู้ตอบแบบสอบถาม

ผู้ตอบแบบสอบถามมีลักษณะของเพศผู้มากกว่าเพศเมีย ร้อยละ 62.1 เพศชาย ร้อยละ 37.9 สำหรับช่วงอายุของผู้ตอบแบบสอบถามมีดังนี้ พบว่า ส่วนใหญ่มีอายุมากกว่า 60 ปีขึ้นไป ร้อยละ 30.4 รองลงมา มีอายุระหว่าง 51-60 ปี ร้อยละ 25.6 มีอายุระหว่าง 41-50 ปี ร้อยละ 24.5 มีอายุระหว่าง 31-40 ปี ร้อยละ 13.1 และมีอายุระหว่าง 21-30 ปี ร้อยละ 6.4 ตามลำดับ ผู้ตอบแบบสอบถามส่วนใหญ่ จบการศึกษาระดับประถมศึกษา ร้อยละ 62.1 รองลงมา จบการศึกษาระดับมัธยมศึกษาตอนต้น ร้อยละ 16.2 และจบการศึกษาระดับมัธยมศึกษาตอนปลาย/ปวช. ร้อยละ 15.9 ตามลำดับ

ผู้ตอบแบบสอบถามส่วนใหญ่ประกอบอาชีพเกษตรกรรม เช่น ทำไร่-ทำนา ร้อยละ 48.2 รองลงมา ประกอบอาชีพค้าขาย ร้อยละ 17.3 และประกอบอาชีพรับจ้างทั่วไป ร้อยละ 14.8 ตามลำดับ เมื่อสอบถามถึงการปลูกข้าว พบว่า ผู้ตอบแบบสอบถามส่วนใหญ่ไม่มีการปลูกข้าว ร้อยละ 76.6 และมีการปลูกข้าว ร้อยละ 23.4 และส่วนใหญ่เป็นเจ้าของที่ดิน ร้อยละ 22.6 และเป็นเจ้าของบางส่วน/เช่าบางส่วน ร้อยละ 0.8 โดยส่วนใหญ่ได้เช่าที่ดินมาปลูกข้าว ร้อยละ 21.4 และเช่าที่ดิน ร้อยละ 6.2 ส่วนด้านปัญหาของที่ดินในการทำไร่-ทำนา พบว่าส่วนใหญ่ระบุว่าไม่มีปัญหา ร้อยละ 23.4 และมีปัญหา ร้อยละ 3.1 โดยปัญหาที่พบอยู่ในช่วงฤดูแล้งระหว่างเดือน มกราคม เมษายน เป็นต้น

รายได้ของครัวเรือนเฉลี่ยต่อเดือน พบว่า ผู้ตอบแบบสอบถามส่วนใหญ่ มีรายได้ระหว่าง 10,000-15,000 บาท ร้อยละ 34.5 รองลงมา มีรายได้ระหว่าง 15,000-20,000 บาท ร้อยละ 33.4 มีรายได้ 20,001-25,000 บาท ร้อยละ 12.5 ตามลำดับ ในส่วนของรายจ่ายของครัวเรือนเฉลี่ยต่อเดือน พบว่า ผู้ตอบแบบสอบถามส่วนใหญ่มีรายจ่ายของครัวเรือน 10,001-15,000 บาท ร้อยละ 36.8 รองลงมา มีรายจ่ายระหว่าง 15,001-20,000 บาท ร้อยละ 31.5 และมีรายจ่ายระหว่าง 20,001-25,000 บาท ร้อยละ 12.3 ตามลำดับ ทั้งนี้เมื่อสอบถามเกี่ยวกับการประกอบอาชีพในปัจจุบัน เมื่อเปรียบเทียบกับปีที่ผ่านมา ผู้ตอบแบบสอบถามส่วนใหญ่ระบุว่ารายได้ลดลง ร้อยละ 49.6 รองลงมา รายได้เท่าเดิม ร้อยละ 34.8 และเพิ่มขึ้นเล็กน้อย ร้อยละ 15.6 ตามลำดับ

ภูมิฐานะเดิมของผู้ตอบแบบสอบถาม พบว่า ส่วนใหญ่อาศัยอยู่ในชุมชนแออัด ร้อยละ 96.7 ที่เหลือ ร้อยละ 3.3 ระยะเวลาที่ย้ายมาอยู่ในชุมชนแออัดเป็นระยะเวลาที่นานกว่า 21 ปีขึ้นไป ร้อยละ 1.9 รองลงมา ระยะเวลา 11-21 ปี ร้อยละ 0.8 และระยะเวลา 3-5 ปี ร้อยละ 6-10 ปี และ 16-20 ปี ร้อยละ 0.3 การย้ายมาอาศัยอยู่ในชุมชนแออัดในภาคกลางมากที่สุด ร้อยละ 2.1 โดยสาเหตุที่ย้ายมาอาศัยอยู่ในชุมชนแออัดมีสาเหตุหลัก 3 ประการ คือ 1. ต้องการหางานทำ 1.7 และย้ายมาอาศัยอยู่กับญาติพี่น้อง 1.6 ตามลำดับ

เมื่อสอบถามถึงการโยกย้ายไปอยู่ที่อื่นของผู้ตอบแบบสอบถาม พบว่า ผู้ตอบแบบสอบถามส่วนใหญ่ไม่มีการโยกย้ายไปอยู่ที่อื่น ร้อยละ 99.2 และมีการโยกย้ายไปอยู่ที่อื่น ร้อยละ 0.8 นอกจากนี้ ผู้ตอบแบบสอบถามส่วนใหญ่ไม่มีความรู้เกี่ยวกับโครงการโยกย้ายไปอยู่ที่อื่น ร้อยละ 99.2 รองลงมา ย้ายไปอยู่ที่อื่น ร้อยละ 0.6 และคิดจะย้าย ร้อยละ 0.2 ตามลำดับ และเมื่อสอบถามถึงจำนวนผู้สูงอายุ พบว่า ผู้ตอบแบบสอบถามทั้งหมด คิดว่าผู้สูงอายุของตนเป็นผู้สูงอายุที่น้อย

#### ปัญหาสิ่งแวดล้อมของชุมชนในปัจจุบัน

จากการศึกษาปัญหาสิ่งแวดล้อมของชุมชนในด้านต่างๆ พบว่า ผู้ตอบแบบสอบถามส่วนใหญ่มีความคิดเห็นว่า ปัญหาสิ่งแวดล้อมของชุมชนที่พบในปัจจุบัน คือ ปัญหาขยะของเสีย สิ่งแวดล้อมที่สกปรก ร้อยละ 25.3 โดยมีผลกระทบในระดับปานกลาง ร้อยละ 18.7 รองลงมา เป็นปัญหาน้ำท่วมและน้ำแล้ง ร้อยละ 15.9 ได้รับผลกระทบ ร้อยละ 8.9 โดยมีผลกระทบในระดับปานกลาง ร้อยละ 4.5 และอันดับสาม ปัญหามลพิษทางอากาศ ร้อยละ 3.7 / น้อย

ได้รับผลกระทบ ร้อยละ 7.8 โดยมีผลกระทบในระดับปานกลาง ร้อยละ 5.0 ในส่วนความคิดเห็นเกี่ยวกับปัญหาสิ่งแวดล้อมในชุมชนด้านสิ่งแวดล้อมทางสังคม พบว่า ผู้ตอบแบบสอบถามส่วนใหญ่มีความคิดเห็นว่าดี ร้อยละ 8.9

#### ตารางที่ 8 ความพึงพอใจด้านปัญหามลพิษของชุมชนในปัจจุบัน

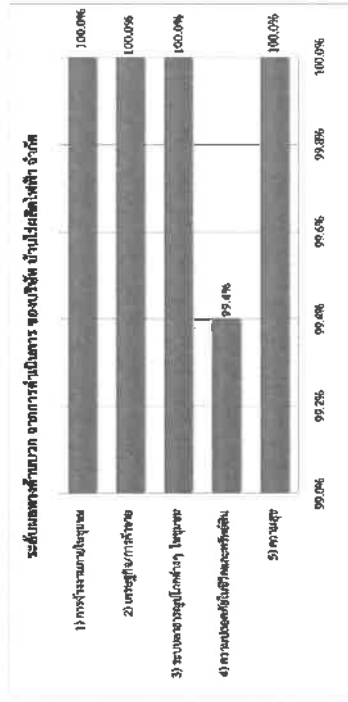
ปัญหามลพิษของชุมชน	ไม่มีผลกระทบ	ได้รับผลกระทบเล็กน้อย	ได้รับผลกระทบปานกลาง	ได้รับผลกระทบมาก
1) ปัญหามลพิษทางอากาศ				
- ปัญหามลพิษทางอากาศ	91.1	8.9	4.2	4.5
- ปัญหามลพิษทางน้ำ	74.7	25.3	3.9	13.7
- ปัญหามลพิษทางดิน	93.9	6.1	2.8	3.1
- ปัญหามลพิษทางเสียง	95.8	4.2	3.1	1.1
2) ปัญหาสิ่งแวดล้อมทางสังคม	96.7	3.3	1.9	1.4
3) ปัญหาสิ่งแวดล้อมทางวัฒนธรรม	98.9	1.1	0.0	0.3
4) ปัญหาสิ่งแวดล้อมทางเศรษฐกิจ	99.4	0.6	0.3	0.0
5) ปัญหาสิ่งแวดล้อมทางสุขภาพ				
- ปัญหามลพิษทางอากาศ	99.7	0.3	0.0	0.3
- ปัญหามลพิษทางน้ำ	92.2	7.8	2.5	5.0
- ปัญหามลพิษทางดิน	100.0	0.0	0.0	0.0
- ปัญหามลพิษทางเสียง	97.5	2.5	0.3	2.2
6) ปัญหาสิ่งแวดล้อมทางสังคม	99.4	0.6	0.3	0.3
7) ปัญหาสิ่งแวดล้อมทางวัฒนธรรม	99.4	0.6	0.3	0.3
8) ปัญหาสิ่งแวดล้อมทางเศรษฐกิจ	99.4	0.6	0.3	0.3
9) ปัญหาสิ่งแวดล้อมทางสุขภาพ	99.4	0.6	0.3	0.3
10) ปัญหาสิ่งแวดล้อมทางสังคม	99.4	0.6	0.3	0.3
11) ปัญหาสิ่งแวดล้อมทางวัฒนธรรม	99.4	0.6	0.3	0.3
12) ปัญหาสิ่งแวดล้อมทางเศรษฐกิจ	99.4	0.6	0.3	0.3
13) ปัญหาสิ่งแวดล้อมทางสุขภาพ	99.4	0.6	0.3	0.3
14) ปัญหาสิ่งแวดล้อมทางสังคม	99.4	0.6	0.3	0.3
15) ปัญหาสิ่งแวดล้อมทางวัฒนธรรม	99.4	0.6	0.3	0.3
16) ปัญหาสิ่งแวดล้อมทางเศรษฐกิจ	99.4	0.6	0.3	0.3
17) ปัญหาสิ่งแวดล้อมทางสุขภาพ	99.4	0.6	0.3	0.3
18) ปัญหาสิ่งแวดล้อมทางสังคม	99.4	0.6	0.3	0.3
19) ปัญหาสิ่งแวดล้อมทางวัฒนธรรม	99.4	0.6	0.3	0.3
20) ปัญหาสิ่งแวดล้อมทางเศรษฐกิจ	99.4	0.6	0.3	0.3
21) ปัญหาสิ่งแวดล้อมทางสุขภาพ	99.4	0.6	0.3	0.3
22) ปัญหาสิ่งแวดล้อมทางสังคม	99.4	0.6	0.3	0.3
23) ปัญหาสิ่งแวดล้อมทางวัฒนธรรม	99.4	0.6	0.3	0.3
24) ปัญหาสิ่งแวดล้อมทางเศรษฐกิจ	99.4	0.6	0.3	0.3
25) ปัญหาสิ่งแวดล้อมทางสุขภาพ	99.4	0.6	0.3	0.3
26) ปัญหาสิ่งแวดล้อมทางสังคม	99.4	0.6	0.3	0.3
27) ปัญหาสิ่งแวดล้อมทางวัฒนธรรม	99.4	0.6	0.3	0.3
28) ปัญหาสิ่งแวดล้อมทางเศรษฐกิจ	99.4	0.6	0.3	0.3
29) ปัญหาสิ่งแวดล้อมทางสุขภาพ	99.4	0.6	0.3	0.3
30) ปัญหาสิ่งแวดล้อมทางสังคม	99.4	0.6	0.3	0.3
31) ปัญหาสิ่งแวดล้อมทางวัฒนธรรม	99.4	0.6	0.3	0.3
32) ปัญหาสิ่งแวดล้อมทางเศรษฐกิจ	99.4	0.6	0.3	0.3
33) ปัญหาสิ่งแวดล้อมทางสุขภาพ	99.4	0.6	0.3	0.3
34) ปัญหาสิ่งแวดล้อมทางสังคม	99.4	0.6	0.3	0.3
35) ปัญหาสิ่งแวดล้อมทางวัฒนธรรม	99.4	0.6	0.3	0.3
36) ปัญหาสิ่งแวดล้อมทางเศรษฐกิจ	99.4	0.6	0.3	0.3
37) ปัญหาสิ่งแวดล้อมทางสุขภาพ	99.4	0.6	0.3	0.3
38) ปัญหาสิ่งแวดล้อมทางสังคม	99.4	0.6	0.3	0.3
39) ปัญหาสิ่งแวดล้อมทางวัฒนธรรม	99.4	0.6	0.3	0.3
40) ปัญหาสิ่งแวดล้อมทางเศรษฐกิจ	99.4	0.6	0.3	0.3
41) ปัญหาสิ่งแวดล้อมทางสุขภาพ	99.4	0.6	0.3	0.3
42) ปัญหาสิ่งแวดล้อมทางสังคม	99.4	0.6	0.3	0.3
43) ปัญหาสิ่งแวดล้อมทางวัฒนธรรม	99.4	0.6	0.3	0.3
44) ปัญหาสิ่งแวดล้อมทางเศรษฐกิจ	99.4	0.6	0.3	0.3
45) ปัญหาสิ่งแวดล้อมทางสุขภาพ	99.4	0.6	0.3	0.3
46) ปัญหาสิ่งแวดล้อมทางสังคม	99.4	0.6	0.3	0.3
47) ปัญหาสิ่งแวดล้อมทางวัฒนธรรม	99.4	0.6	0.3	0.3
48) ปัญหาสิ่งแวดล้อมทางเศรษฐกิจ	99.4	0.6	0.3	0.3
49) ปัญหาสิ่งแวดล้อมทางสุขภาพ	99.4	0.6	0.3	0.3
50) ปัญหาสิ่งแวดล้อมทางสังคม	99.4	0.6	0.3	0.3
51) ปัญหาสิ่งแวดล้อมทางวัฒนธรรม	99.4	0.6	0.3	0.3
52) ปัญหาสิ่งแวดล้อมทางเศรษฐกิจ	99.4	0.6	0.3	0.3
53) ปัญหาสิ่งแวดล้อมทางสุขภาพ	99.4	0.6	0.3	0.3
54) ปัญหาสิ่งแวดล้อมทางสังคม	99.4	0.6	0.3	0.3
55) ปัญหาสิ่งแวดล้อมทางวัฒนธรรม	99.4	0.6	0.3	0.3
56) ปัญหาสิ่งแวดล้อมทางเศรษฐกิจ	99.4	0.6	0.3	0.3
57) ปัญหาสิ่งแวดล้อมทางสุขภาพ	99.4	0.6	0.3	0.3
58) ปัญหาสิ่งแวดล้อมทางสังคม	99.4	0.6	0.3	0.3
59) ปัญหาสิ่งแวดล้อมทางวัฒนธรรม	99.4	0.6	0.3	0.3
60) ปัญหาสิ่งแวดล้อมทางเศรษฐกิจ	99.4	0.6	0.3	0.3
61) ปัญหาสิ่งแวดล้อมทางสุขภาพ	99.4	0.6	0.3	0.3
62) ปัญหาสิ่งแวดล้อมทางสังคม	99.4	0.6	0.3	0.3
63) ปัญหาสิ่งแวดล้อมทางวัฒนธรรม	99.4	0.6	0.3	0.3
64) ปัญหาสิ่งแวดล้อมทางเศรษฐกิจ	99.4	0.6	0.3	0.3
65) ปัญหาสิ่งแวดล้อมทางสุขภาพ	99.4	0.6	0.3	0.3
66) ปัญหาสิ่งแวดล้อมทางสังคม	99.4	0.6	0.3	0.3
67) ปัญหาสิ่งแวดล้อมทางวัฒนธรรม	99.4	0.6	0.3	0.3
68) ปัญหาสิ่งแวดล้อมทางเศรษฐกิจ	99.4	0.6	0.3	0.3
69) ปัญหาสิ่งแวดล้อมทางสุขภาพ	99.4	0.6	0.3	0.3
70) ปัญหาสิ่งแวดล้อมทางสังคม	99.4	0.6	0.3	0.3
71) ปัญหาสิ่งแวดล้อมทางวัฒนธรรม	99.4	0.6	0.3	0.3
72) ปัญหาสิ่งแวดล้อมทางเศรษฐกิจ	99.4	0.6	0.3	0.3
73) ปัญหาสิ่งแวดล้อมทางสุขภาพ	99.4	0.6	0.3	0.3
74) ปัญหาสิ่งแวดล้อมทางสังคม	99.4	0.6	0.3	0.3
75) ปัญหาสิ่งแวดล้อมทางวัฒนธรรม	99.4	0.6	0.3	0.3
76) ปัญหาสิ่งแวดล้อมทางเศรษฐกิจ	99.4	0.6	0.3	0.3
77) ปัญหาสิ่งแวดล้อมทางสุขภาพ	99.4	0.6	0.3	0.3
78) ปัญหาสิ่งแวดล้อมทางสังคม	99.4	0.6	0.3	0.3
79) ปัญหาสิ่งแวดล้อมทางวัฒนธรรม	99.4	0.6	0.3	0.3
80) ปัญหาสิ่งแวดล้อมทางเศรษฐกิจ	99.4	0.6	0.3	0.3
81) ปัญหาสิ่งแวดล้อมทางสุขภาพ	99.4	0.6	0.3	0.3
82) ปัญหาสิ่งแวดล้อมทางสังคม	99.4	0.6	0.3	0.3
83) ปัญหาสิ่งแวดล้อมทางวัฒนธรรม	99.4	0.6	0.3	0.3
84) ปัญหาสิ่งแวดล้อมทางเศรษฐกิจ	99.4	0.6	0.3	0.3
85) ปัญหาสิ่งแวดล้อมทางสุขภาพ	99.4	0.6	0.3	0.3
86) ปัญหาสิ่งแวดล้อมทางสังคม	99.4	0.6	0.3	0.3
87) ปัญหาสิ่งแวดล้อมทางวัฒนธรรม	99.4	0.6	0.3	0.3
88) ปัญหาสิ่งแวดล้อมทางเศรษฐกิจ	99.4	0.6	0.3	0.3
89) ปัญหาสิ่งแวดล้อมทางสุขภาพ	99.4	0.6	0.3	0.3
90) ปัญหาสิ่งแวดล้อมทางสังคม	99.4	0.6	0.3	0.3
91) ปัญหาสิ่งแวดล้อมทางวัฒนธรรม	99.4	0.6	0.3	0.3
92) ปัญหาสิ่งแวดล้อมทางเศรษฐกิจ	99.4	0.6	0.3	0.3
93) ปัญหาสิ่งแวดล้อมทางสุขภาพ	99.4	0.6	0.3	0.3
94) ปัญหาสิ่งแวดล้อมทางสังคม	99.4	0.6	0.3	0.3
95) ปัญหาสิ่งแวดล้อมทางวัฒนธรรม	99.4	0.6	0.3	0.3
96) ปัญหาสิ่งแวดล้อมทางเศรษฐกิจ	99.4	0.6	0.3	0.3
97) ปัญหาสิ่งแวดล้อมทางสุขภาพ	99.4	0.6	0.3	0.3
98) ปัญหาสิ่งแวดล้อมทางสังคม	99.4	0.6	0.3	0.3
99) ปัญหาสิ่งแวดล้อมทางวัฒนธรรม	99.4	0.6	0.3	0.3
100) ปัญหาสิ่งแวดล้อมทางเศรษฐกิจ	99.4	0.6	0.3	0.3



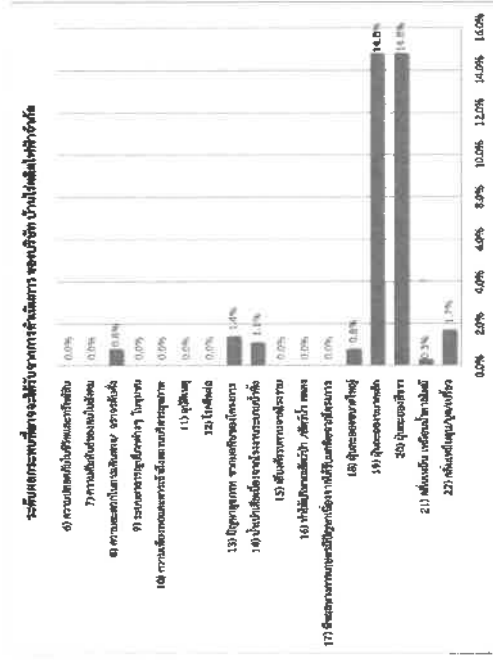


ตารางที่ 10 พัฒนคติและความคิดที่เห็นเกี่ยวกับการดำเนินงานของโรงงานที่ส่งผลกระทบต่อคุณภาพชีวิตของชุมชนชน จ้าแนกตามระดับความรุนแรงในแต่ละประเภทปี

ผลการประเมินการดำเนินงานตามแผนกลยุทธ์	ผลการบรรลุตามตัวบ่งชี้	การให้บริการ (ร้อยละ)			
		ไม่ได้รับ	ได้รับ	ระดับของผลการบริการ	
				น้อย	มาก
<b>ผลการดำเนินงาน</b>					
1) การจัดหาทุนไปลงทุน	0.0	100.0	5.5	56.3	38.2
2) เศรษฐกิจ/การค้าที่ขยาย	0.0	100.0	4.8	73.5	21.7
3) ระบบสาธารณสุขปลอดภัยไปชุมชน	0.0	100.0	8.4	62.1	29.5
4) ความปลอดภัยในชีวิตและทรัพย์สิน	0.6	99.4	12.2	63.0	24.2
5) ความสะอาด	0.0	100.0	15.9	61.3	22.8
<b>ผลการประเมินข้อเสนอ</b>					
6) ความปลอดภัยในชีวิตและทรัพย์สิน	100.0	0.0	0.0	0.0	0.0
7) ความสัมพันธ์กับชุมชนในท้องถิ่น	100.0	0.0	0.0	0.0	0.0
8) ความสะดวกในการเดินทาง/จราจรที่คล่อง	99.2	0.8	0.2	0.6	0.0
9) ระบบสาธารณสุขปลอดภัยไปชุมชน	100.0	0.0	0.0	0.0	0.0
10) ความเสียสละและการใช้สอยบริการสุขภาพ	100.0	0.0	0.0	0.0	0.0
11) ปลอดภัย	100.0	0.0	0.0	0.0	0.0
12) โรคติดต่อ	100.0	0.0	0.0	0.0	0.0
13) ปัญหาสุขภาพ จากแหล่งของโครงการ	98.6	1.4	0.0	1.4	0.0
14) นำมาซึ่งเนื่องจากโครงการระบบน้ำทิ้ง	98.9	1.1	0.3	0.8	0.0
15) ขยะจากโรงงานที่มีชีวิตชีวาชุมชน	100.0	0.0	0.0	0.0	0.0
16) เสียงดังรบกวนจากโครงการ	100.0	0.0	0.0	0.0	0.0
17) ระยะเวลาการก่อสร้างมีปัญหามากเนื่องจากได้รับอนุมัติโครงการ	100.0	0.0	0.0	0.0	0.0
18) ผลกระทบด้านสุขภาพของ อ่างขยะฝุ่น 18.1 / น้ำท่าขนาดใหญ่	99.2	0.8	0.0	0.8	0.0
18.2 / น้ำท่าขนาดเล็ก	85.2	14.8	1.7	13.1	0.0
18.3 ช่วงยาว	85.2	14.8	1.7	13.1	0.0
19) ผลกระทบด้านสิ่งแวดล้อม อากาศกลิ่น	99.7	0.3	0.3	0.0	0.0
19.1 / น้ำท่าใหญ่	96.3	1.7	0.6	1.1	0.0
19.2 / กลิ่น / ๒๐ / น้ำเสีย					



รูปที่ 4 กราฟแสดงระดับผลสัมฤทธิ์ ของงานวิชาการ ของบริษัท บ้านไผ่ผลิตภัณฑ์ จำกัด



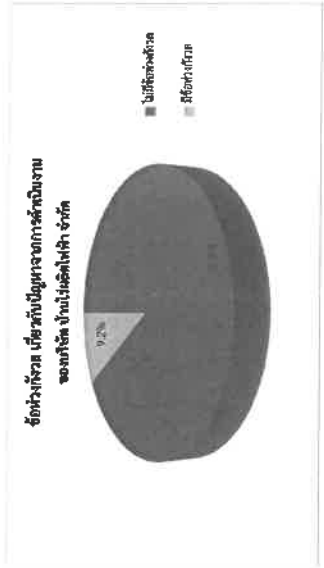
รูปที่ 5 กราฟแสดงผลลัพธ์ทางจิตสังคมจากการดำเนินการ ของบริษัท บ้านไร่สวัสดิ์ไฟฟ้า จำกัด

เมื่อสอบถามถึงเหตุผลที่ใช้ในการแสดงความคิดเห็นจากการดำเนินการของโรงเรียนที่ส่งผลกระทบต่อชุมชน พบว่า ผู้ตอบแบบสอบถามส่วนใหญ่จะระบุเหตุผลเอง ร้อยละ 64.7 รองลงมาจากคำบอกเล่าของเพื่อนบ้าน ร้อยละ 23.0 และจากทางประจักษ์ ร้อยละ 5.9 ตามลำดับ

ความคิดเห็นต่อผลกระทบจากการดำเนินงานของโรงเรียนในปัจจุบัน ผู้ตอบแบบสอบถาม ส่วนใหญ่เห็นว่า มีผลดีมากกว่าผลเสีย ร้อยละ 96.9 รองลงมาไม่มีผลดี หรือผลเสีย ร้อยละ 2.2 และมีผลเสียมากกว่าผลดี ร้อยละ 0.9 ตามลำดับ

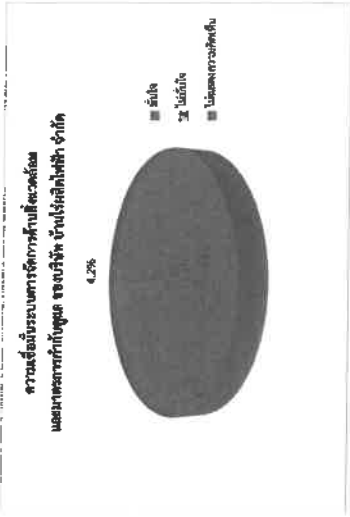
ความคิดเห็นต่อการดำเนินการของโรงเรียน พบว่า ผู้ตอบแบบสอบถามส่วนใหญ่ ไม่มีความกังวล ร้อยละ 90.8 และ มีความกังวล ร้อยละ 9.2 ในส่วนของขั้นตอนแบบสอบถามที่มีความกังวล พบว่า มีความกังวลใจมากที่สุดในเรื่องข้อมูลของ/ ออกจากเสีย รองลงมาใช้น้ำเสีย และปริมาณขยะที่เพิ่มขึ้น ตามลำดับและแสดงดังรูปที่ 6

เมื่อสอบถามถึงวิธีลดความกังวลต่อการดำเนินงาน พบว่า ผู้ตอบแบบสอบถามส่วนใหญ่ เห็นว่า มีการ ให้อุปกรณ์อย่างต่อเนื่อง ร้อยละ 23.5 รองลงมาในปีงบประมาณ ร้อยละ 27.1 และตอบสนองอย่างรวดเร็วเมื่อเกิดเหตุ ร้อยละ 24.0 ตามลำดับ



รูปที่ 6 กราฟแสดงข้อห่วงกังวล เกี่ยวกับปัญหาจากการดำเนินงาน  
ของโรงเรียน โพธิ์ตาก ปีการศึกษา ๒๕๖๕

ความเชื่อรับทราบการจัดการด้านสิ่งแวดล้อมและแผนพหุภาคีของโรงเรียน จากการดำเนินงาน โรงเรียนโพธิ์ตากสามารถจัดการผลิต 9.9 เมกะวัตต์ (ระยะดำเนินการ) ของบริษัท บ้านโพธิ์ตาก จำกัด พบว่า ผู้ตอบแบบสอบถามส่วนใหญ่ มีความพึงพอใจ ร้อยละ 93.8 และไม่แสดงความพึงพอใจ ร้อยละ 4.2 และแสดงดังรูปที่ 7



รูปที่ 7 กราฟแสดงความเชื่อรับทราบการจัดการด้านสิ่งแวดล้อมและแผนพหุภาคีของ  
โรงเรียนโพธิ์ตาก ปีการศึกษา ๒๕๖๕

ความพึงพอใจต่อกิจกรรมชุมชนสัมพันธ์โรงเรียน ได้ดำเนินการในปี 2564 ดังแสดง

จากการสำรวจการดำเนินงานที่พึงพอใจต่อกิจกรรมชุมชนสัมพันธ์ของบริษัทฯ ได้ดำเนินการในปี 2564 ดังแสดง ของ  
ประชาชนท้องถิ่นต่าง ๆ ดังนี้ และตารางที่ 11

1. กิจกรรมเกี่ยวกับชุมชน พบว่า ผู้ตอบแบบสอบถามมีความพึงพอใจระดับที่ ร้อยละ 70.5 รองลงมา มีระดับความพึงพอใจระดับปานกลาง ร้อยละ 26.7 และมีระดับความพึงพอใจระดับต่ำ ร้อยละ 1.7 ตามลำดับ
2. กิจกรรมเกี่ยวกับทรัพยากรธรรมชาติและสิ่งแวดล้อม พบว่า ผู้ตอบแบบสอบถามมีความพึงพอใจระดับที่ ร้อยละ 66.9 รองลงมา มีระดับความพึงพอใจระดับปานกลาง ร้อยละ 29.8 และมีระดับความพึงพอใจระดับต่ำ ร้อยละ 2.2 ตามลำดับ
3. กิจกรรมเกี่ยวกับการส่งเสริมและสนับสนุน พบว่า ผู้ตอบแบบสอบถามมีความพึงพอใจระดับที่ ร้อยละ 60.7 รองลงมา มีระดับความพึงพอใจระดับปานกลาง ร้อยละ 35.7 และมีระดับความพึงพอใจระดับต่ำ ร้อยละ 2.8 ตามลำดับ
4. กิจกรรมเกี่ยวกับความยั่งยืนและความรับผิดชอบต่อสังคม พบว่า ผู้ตอบแบบสอบถามมีความพึงพอใจระดับที่ ร้อยละ 58.8 รองลงมา มีระดับความพึงพอใจระดับปานกลาง ร้อยละ 36.2 และมีระดับความพึงพอใจระดับต่ำ ร้อยละ 3.9 ตามลำดับ
5. กิจกรรมเกี่ยวกับแผนผังเมืองและสิ่งแวดล้อม พบว่า ผู้ตอบแบบสอบถามมีความพึงพอใจระดับที่ ร้อยละ 62.7 รองลงมา มีระดับความพึงพอใจระดับปานกลาง ร้อยละ 32.9 และมีระดับความพึงพอใจระดับต่ำ ร้อยละ 3.3 ตามลำดับ
6. กิจกรรมการประชาสัมพันธ์และแจ้งข่าวสารของโรงเรียน พบว่า ผู้ตอบแบบสอบถามมีความพึงพอใจระดับที่ ร้อยละ 54.9 รองลงมา มีระดับความพึงพอใจระดับปานกลาง ร้อยละ 40.9 และมีระดับความพึงพอใจระดับต่ำ ร้อยละ 3.1 ตามลำดับ

ตารางที่ 11 ความพึงพอใจต่อกิจกรรม (เมื่อนับพื้นที่บริษัทฯ ได้ดำเนินการในปี 2564 ที่ผ่านมา)

ผลการดำเนินงานด้านวิชาการ	ระดับความพึงพอใจ(ร้อยละ)				
	ดีมาก	ดี	ปานกลาง	พอใช้	ควรปรับปรุง
1) กิจกรรมเกี่ยวกับสุขภาพ	1.1	70.5	26.7	1.7	0.0
2) กิจกรรมเกี่ยวกับการอนุรักษ์สิ่งแวดล้อม	2.2	65.9	29.8	1.1	0.0
3) กิจกรรมเกี่ยวกับบริการส่งเสริมการศึกษา	2.8	60.7	35.7	0.8	0.0
4) กิจกรรมเกี่ยวกับบริการพัฒนาพื้นที่ป่าชุมชน	3.9	58.8	36.2	1.1	0.0
5) กิจกรรมเกี่ยวกับบริการส่งเสริมศาสนา	3.3	62.7	32.9	1.1	0.0
6) กิจกรรมการประชาสัมพันธ์เผยแพร่ข่าวสารของโรงเรียน	3.1	54.9	40.9	1.1	0.0

**ข้อมูลส่วนบุคคลที่เราเก็บมาจากรายงาน**

ข้อเสนอแนะหรือข้อคิดเห็นอื่นๆ ต่อโรงงาน พบว่า ผู้ตอบแบบสอบถามมีความคิดเห็นเพิ่มเติม ดังนี้

- [illegible]

ชุดอุปกรณ์ภายในส่วนนี้จำหน่าย และใช้สำหรับแสดงภาพแก่ประชาชน ส่วนนี้แสดงให้เห็นเครื่องมือที่ใช้เพื่อหา

[illegible]

อุตสาหกรรมน้ำตาลบ้านไร่ จำกัด

เมื่อสอบถามถึงงานคิดเห็นเกี่ยวกับผลกระทบด้านสิ่งแวดล้อม เศรษฐกิจและสังคมจากโครงการ ผู้นอบ  
แบบสอบถามในชุมชนพบว่า โครงการก่อให้เกิดประโยชน์ด้านบวก คือ ผู้ตอบแบบสอบถามส่วนใหญ่มีความคิดเห็นว่าการ  
ดำเนินงานของโครงการ ส่งผลให้เกิดการพัฒนาในชุมชน 100% ซึ่งผู้ตอบ/กิจกรรมต่างๆ ช่วยเสริมสร้างเศรษฐกิจ  
ด้านในชุมชน และช่วยทำให้เกิดการเติบโตขึ้นด้านอื่นๆ ร้อยละ 90.0 และช่วยเพิ่มความโดดเด่นในเชิงแบรนด์หรือชื่อ ร้อยละ  
99.4 ตามลำดับ ในด้านความคิดเห็นที่ด้านผลกระทบเชิงลบ พบว่า ผู้ตอบแบบสอบถามส่วนใหญ่มีความคิดเห็นว่าการ  
ดำเนินงานของโครงการทำให้เกิดการดำเนินงานของ 2 ลักษณะสำคัญ และผู้ตอบว่าทั้งนี้ ร้อยละ 14.8 มีผลกระทบในระดั  
กลางเท่านั้น ร้อยละ 13.1 ระบุว่าผลกระทบทางด้านกลิ่นเหม็นลักษณะกลิ่นคาว/กลิ่นเหม็น ร้อยละ 1.7 มีผลกระทบใน  
ระดับปานกลาง ร้อยละ 1.1 และยังมีความ สัมพันธ์ทางสุขภาพ จากผลกระทบด้านกลิ่นเหม็น ร้อยละ 1.3 โดยมี  
ผลกระทบในระดับปานกลาง ร้อยละ 1.4 ระบุว่าไม่มี

ผู้สอบแบบสอบถามส่วนใหญ่เป็นผู้ป่วย และผู้ดูแลแบบสอบถามส่วนใหญ่เป็นผู้ป่วยหรือญาติผู้ป่วย  
ต่าง ๆ ของโรงพยาบาล เนื่องจากโรงพยาบาลมีผู้ป่วยมางวด เมื่อสอบถามถึงความถี่ของการทำแบบสอบถามพบว่า มีคนไข้ทำในเวลามื้อเที่ยง  
ผู้ตอบแบบสอบถามส่วนใหญ่มีความกังวล ในหัวข้อง่ายตอบแบบสอบถามที่มีความกังวล พบว่า มีความเข้าใจในข้อคำถาม  
ทางคลินิกมากที่สุดของเจ้าหน้าที่ เมื่อสอบถามถึงงานที่ใช้ในประเภทการศึกษาค้นคว้าแล้วตอบแบบสอบถามการเก็บดูแล  
รายละเอียดและสิ่งที่ต้องทำเป็นงานไปใช้ในชีวิตประจำวันพบว่าผู้ทำเฉลี่ยที่ 9.9 คะแนน (ร้อยละ 100) ของงานที่ทำ  
ให้เสียค่าใช้จ่าย ของการ ผู้ตอบแบบสอบถามส่วนใหญ่ไม่ทราบการจัดการด้านสิ่งแวดล้อมภายใน ของบริษัท  
อุตสาหกรรมยานยนต์ส่วนใหญ่ใช้ จักต

ภาคผนวก ข-2

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รายงานผลการตรวจวัด

## ANALYSIS REPORT

**CUSTOMER NAME** : BANGKOK ELECTRICITY GENERATING COMPANY LIMITED  
**ADDRESS** : 111 MOO 12 THAP LUANG BAN RAI UTHAI THANI 61140  
**CONTACT INFORMATION** : TEL : 09 592 6395 E-MAIL : Safety@bse.co.th  
**SAMPLING SOURCE** : AMBIENT  
**SAMPLE TYPE** : AMBIENT  
**SAMPLING DATE** : AUGUST 1, 2022  
**SAMPLING TIME** : 09:30 HOURS  
**SAMPLING BY** : [REDACTED]  
**ANALYZED BY** : [REDACTED]

**RECEIVED DATE** : AUGUST 1, 2022  
**ANALYTICAL DATE** : AUGUST 1-5, 2022  
**REPORT NO.** : 2022-00024  
**WORK NO.** : 2022-00024  
**ANALYSIS NO.** : TZ2K0952-0001 - TZ2K0952-0003

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT		
			TESTED	TESTED	TESTED
TOTAL SUSPENDED PARTICULATE	mg/m <sup>3</sup>	GRAVIMETRIC (HIGH VOLUME METHOD)	0.029	0.032	0.028
PARTICULATE MATTER (≤ 10 µm)	mg/m <sup>3</sup>	GRAVIMETRIC (HIGH VOLUME METHOD)	0.018	0.022	0.014
SAMPLE CONDITION			COMPLETE	COMPLETE	COMPLETE

**REMARK**  
TSP, PM10 : REFERENCE CONDITION IS 25 DEGREE CELSIUS AT 1 ATMOSPHERE.  
TSP : US EPA, CODE OF FEDERAL REGULATION SEARCH RESULTS, 40 CFR-CHAPTER 1 PART 50, APPENDIX B.  
PM10 : US EPA, CODE OF FEDERAL REGULATION SEARCH RESULTS, 40 CFR-CHAPTER 1 PART 50, APPENDIX 1.  
- : SAMPLING FROM 09:30 HOUR ON JULY 24, 2022 TO 09:30 HOUR ON JULY 25, 2022.  
- : SAMPLING FROM 09:30 HOUR ON JULY 25, 2022 TO 09:30 HOUR ON JULY 26, 2022.  
- : SAMPLING FROM 09:30 HOUR ON JULY 26, 2022 TO 09:30 HOUR ON JULY 27, 2022.

AUGUST 9, 2022

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## ANALYSIS REPORT

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**SAMPLING SOURCE** : AMBIENT  
**SAMPLE TYPE** : AMBIENT  
**SAMPLING DATE** : AUGUST 1, 2022  
**SAMPLING TIME** : 09:30 HOURS  
**SAMPLING BY** : [REDACTED]  
**ANALYZED BY** : [REDACTED]

**RECEIVED DATE** : AUGUST 1, 2022  
**ANALYTICAL DATE** : AUGUST 1-5, 2022  
**REPORT NO.** : 2022-00024  
**WORK NO.** : 2022-00024  
**ANALYSIS NO.** : TZ2K0952-0004 - TZ2K0952-0006

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT		
			TESTED	TESTED	TESTED
TOTAL SUSPENDED PARTICULATE	mg/m <sup>3</sup>	GRAVIMETRIC (HIGH VOLUME METHOD)	0.022	0.025	0.031
PARTICULATE MATTER (≤ 10 µm)	mg/m <sup>3</sup>	GRAVIMETRIC (HIGH VOLUME METHOD)	0.020	0.022	0.021
SAMPLE CONDITION			COMPLETE	COMPLETE	COMPLETE

**REMARK**  
TSP, PM10 : REFERENCE CONDITION IS 25 DEGREE CELSIUS AT 1 ATMOSPHERE.  
TSP : US EPA, CODE OF FEDERAL REGULATION SEARCH RESULTS, 40 CFR-CHAPTER 1 PART 50, APPENDIX B.  
PM10 : US EPA, CODE OF FEDERAL REGULATION SEARCH RESULTS, 40 CFR-CHAPTER 1 PART 50, APPENDIX 1.  
- : SAMPLING FROM 10:00 HOUR ON JULY 24, 2022 TO 10:00 HOUR ON JULY 25, 2022.  
- : SAMPLING FROM 10:00 HOUR ON JULY 25, 2022 TO 10:00 HOUR ON JULY 26, 2022.  
- : SAMPLING FROM 10:00 HOUR ON JULY 26, 2022 TO 10:00 HOUR ON JULY 27, 2022.

AUGUST 9, 2022

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MSC-TIS-TIS 1765  
TESTING 007

### ANALYSIS REPORT

**CUSTOMER NAME** : BANRAI ELECTRICITY GENERATING COMPANY LIMITED  
**ADDRESS** : 238 NARADHIWAS RAJANAGARINDRA CHONG MONSI YAN NAWA BANGKOK 10120  
**CONTACT INFORMATION** : TEL : 09 5932 6355 e-mail : Safety@ljae.com  
**SAMPLING SOURCE** : AMBIENT  
**SAMPLE TYPE** : AMBIENT  
**SAMPLING DATE** : DECEMBER 22, 2022  
**SAMPLING TIME** : DECEMBER 22-26, 2022  
**SAMPLING BY** : [REDACTED]  
**ANALYZED BY** : [REDACTED]  
**RECEIVED DATE** : DECEMBER 22, 2022  
**ANALYTICAL DATE** : DECEMBER 22-26, 2022  
**REPORT NO.** : 2023-LJ00011  
**WORK NO.** : 2023-009705  
**ANALYSIS NO.** : T23A2500-0001 - T23A2500-0003

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT		
			1	2	3
TOTAL SUSPENDED PARTICULATE	mg/m <sup>3</sup>	GRAVIMETRIC (HIGH VOLUME METHOD)	0.081	0.038	0.051
PARTICULATE MATTER (≤ 10 μm)	mg/m <sup>3</sup>	GRAVIMETRIC (HIGH VOLUME METHOD)	0.038	0.024	0.026
SAMPLE CONDITION			COMPLETE	COMPLETE	COMPLETE

**REMARK**  
TSP, PM10 : REFERENCE CONDITION IS 25 DEGREE CELSIUS AT 1 ATMOSPHERE.  
TSP : US EPA, CODE OF FEDERAL REGULATION SEARCH RESULTS, 40 CFR-CHAPTER 1 PART 50, APPENDIX B.  
PM10 : US EPA, CODE OF FEDERAL REGULATION SEARCH RESULTS, 40 CFR-CHAPTER 1 PART 50, APPENDIX A.  
PM10 : SAMPLING FROM 08:30 HOUR ON DECEMBER 15, 2022 TO 08:30 HOUR ON DECEMBER 16, 2022.  
PM10 : SAMPLING FROM 08:30 HOUR ON DECEMBER 16, 2022 TO 08:30 HOUR ON DECEMBER 17, 2022.  
PM10 : SAMPLING FROM 08:30 HOUR ON DECEMBER 17, 2022 TO 08:30 HOUR ON DECEMBER 18, 2022.  
PM10 : SAMPLING FROM 08:30 HOUR ON DECEMBER 18, 2022 TO 08:30 HOUR ON DECEMBER 19, 2022.

JANUARY 4, 2023

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MSC-TIS-TIS 1765  
TESTING 007

### ANALYSIS REPORT

**CUSTOMER NAME** : BANRAI ELECTRICITY GENERATING COMPANY LIMITED  
**ADDRESS** : 238 NARADHIWAS RAJANAGARINDRA CHONG MONSI YAN NAWA BANGKOK 10120  
**CONTACT INFORMATION** : TEL : 09 5932 6355 e-mail : Safety@ljae.com  
**SAMPLING SOURCE** : AMBIENT  
**SAMPLE TYPE** : AMBIENT  
**SAMPLING DATE** : DECEMBER 22, 2022  
**SAMPLING TIME** : DECEMBER 22-26, 2022  
**SAMPLING BY** : [REDACTED]  
**ANALYZED BY** : [REDACTED]  
**RECEIVED DATE** : DECEMBER 22, 2022  
**ANALYTICAL DATE** : DECEMBER 22-26, 2022  
**REPORT NO.** : 2023-LJ00014  
**WORK NO.** : 2023-009706  
**ANALYSIS NO.** : T23A2500-0004 - T23A2500-0007

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT		
			1	2	3
TOTAL SUSPENDED PARTICULATE	mg/m <sup>3</sup>	GRAVIMETRIC (HIGH VOLUME METHOD)	0.075	0.052	0.076
PARTICULATE MATTER (≤ 10 μm)	mg/m <sup>3</sup>	GRAVIMETRIC (HIGH VOLUME METHOD)	0.045	0.035	0.044
SAMPLE CONDITION			COMPLETE	COMPLETE	COMPLETE

**REMARK**  
TSP, PM10 : REFERENCE CONDITION IS 25 DEGREE CELSIUS AT 1 ATMOSPHERE.  
TSP : US EPA, CODE OF FEDERAL REGULATION SEARCH RESULTS, 40 CFR-CHAPTER 1 PART 50, APPENDIX B.  
PM10 : US EPA, CODE OF FEDERAL REGULATION SEARCH RESULTS, 40 CFR-CHAPTER 1 PART 50, APPENDIX A.  
PM10 : SAMPLING FROM 08:30 HOUR ON DECEMBER 18, 2022 TO 08:30 HOUR ON DECEMBER 19, 2022.  
PM10 : SAMPLING FROM 08:30 HOUR ON DECEMBER 19, 2022 TO 08:30 HOUR ON DECEMBER 20, 2022.  
PM10 : SAMPLING FROM 08:30 HOUR ON DECEMBER 20, 2022 TO 08:30 HOUR ON DECEMBER 21, 2022.  
PM10 : SAMPLING FROM 08:30 HOUR ON DECEMBER 21, 2022 TO 08:30 HOUR ON DECEMBER 22, 2022.

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HS-118-118 11815  
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### ANALYSIS REPORT

CUSTOMER NAME : SARAI ELECTRICITY GENERATING COMPANY LIMITED  
ADDRESS : 238 MARADHINAS RAJAGARINDRA CHONG HONG YAN NAWA BANGKOK 10120  
CONTACT INFORMATION : TEL : 09 5992 6395 e-mail : Safetytest@protonmail.com

SAMPLING SOURCE : Safetytest  
SAMPLE TYPE : AMBIENT  
SAMPLING DATE : DECEMBER 22, 2022  
ANALYTICAL DATE : DECEMBER 22-26, 2022  
REPORT NO. : 2022-U000015  
WORK NO. : 2022-009705  
ANALYZED BY : [REDACTED]  
ANALYSIS NO. : T22A2600-0010 - T22A2600-0010

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	
			SA	SA
TOTAL SUSPENDED PARTICULATE	mg/m <sup>3</sup>	GRAVIMETRIC (HIGH VOLUME METHOD)	0.036	0.034
PARTICULATE MATTER (≤ 10 µm)	mg/m <sup>3</sup>	GRAVIMETRIC (HIGH VOLUME METHOD)	0.028	0.020
SAMPLE CONDITION			COMPLETE	COMPLETE

REMARK : REFERENCE CONDITION IS 25 DEGREE CELSIUS AT 1 ATMOSPHERE.  
TSP PM10 : US EPA, CODE OF FEDERAL REGULATION SEARCH RESULTS, 40 CFR-CHAPTER 1 PART 50, APPENDIX B.  
PM10 : US EPA, CODE OF FEDERAL REGULATION SEARCH RESULTS, 40 CFR-CHAPTER 1 PART 50, APPENDIX B.  
\* : SAMPLING FROM 05:00 HOUR ON DECEMBER 15, 2022 TO 05:00 HOUR ON DECEMBER 16, 2022.  
\*\* : SAMPLING FROM 05:00 HOUR ON DECEMBER 16, 2022 TO 05:00 HOUR ON DECEMBER 17, 2022.  
\*\*\* : SAMPLING FROM 05:00 HOUR ON DECEMBER 17, 2022 TO 05:00 HOUR ON DECEMBER 18, 2022.

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### ANALYSIS REPORT

CUSTOMER NAME : SARAI ELECTRICITY GENERATING COMPANY LIMITED  
ADDRESS : 238 MARADHINAS RAJAGARINDRA CHONG HONG YAN NAWA BANGKOK 10120  
CONTACT INFORMATION : TEL : 09 5992 6395 e-mail : Safetytest@protonmail.com

SAMPLING SOURCE : Safetytest  
SAMPLE TYPE : AMBIENT  
SAMPLING DATE : DECEMBER 22, 2022  
ANALYTICAL DATE : DECEMBER 22-26, 2022  
REPORT NO. : 2022-U000018  
WORK NO. : 2022-009705  
ANALYZED BY : [REDACTED]  
ANALYSIS NO. : T22A2600-0011 - T22A2600-0014

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	
			SA	SA
TOTAL SUSPENDED PARTICULATE	mg/m <sup>3</sup>	GRAVIMETRIC (HIGH VOLUME METHOD)	0.088	0.042
PARTICULATE MATTER (≤ 10 µm)	mg/m <sup>3</sup>	GRAVIMETRIC (HIGH VOLUME METHOD)	0.048	0.023
SAMPLE CONDITION			COMPLETE	COMPLETE

REMARK : REFERENCE CONDITION IS 25 DEGREE CELSIUS AT 1 ATMOSPHERE.  
TSP PM10 : US EPA, CODE OF FEDERAL REGULATION SEARCH RESULTS, 40 CFR-CHAPTER 1 PART 50, APPENDIX B.  
PM10 : US EPA, CODE OF FEDERAL REGULATION SEARCH RESULTS, 40 CFR-CHAPTER 1 PART 50, APPENDIX B.  
\* : SAMPLING FROM 05:00 HOUR ON DECEMBER 18, 2022 TO 05:00 HOUR ON DECEMBER 19, 2022.  
\*\* : SAMPLING FROM 05:00 HOUR ON DECEMBER 19, 2022 TO 05:00 HOUR ON DECEMBER 20, 2022.  
\*\*\* : SAMPLING FROM 05:00 HOUR ON DECEMBER 20, 2022 TO 05:00 HOUR ON DECEMBER 21, 2022.  
\*\*\*\* : SAMPLING FROM 05:00 HOUR ON DECEMBER 21, 2022 TO 05:00 HOUR ON DECEMBER 22, 2022.

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### ANALYSIS REPORT

**CUSTOMER NAME** : BANGKOK ELECTRICITY GENERATING COMPANY LIMITED  
**ADDRESS** : 238 NARADHWAS RAJANAGARUNDA CHONG MONSI YAN NAWA BANGKOK 10120  
**CONTACT INFORMATION** : TEL. : 09 5972 6395 e-mail : Sate@uae@uaeconsultant.com  
**MEASURING PLACE** : กรุงเทพมหานคร (กรุงเทพมหานคร)  
**MEASURING TYPE** : AMBIENT (AIR)  
**MEASURING DATE** : DECEMBER 15-22, 2022  
**REPORT NO.** : 2022-U03073  
**WORK NO.** : 2022-06705  
**ANALYSIS NO.** : T22A2500-0001 - T22A2500-0007

TIME *	RESULT (ppm)	
	DECEMBER 15-17, 2022 T22A2500-0001	DECEMBER 18-22, 2022 T22A2500-0002
07:00-08:00 HOUR	0.0213	0.0202
08:00-09:00 HOUR	0.0221	0.0215
09:00-10:00 HOUR	0.0204	0.0228
10:00-11:00 HOUR	0.0203	0.0211
11:00-12:00 HOUR	0.0209	0.0194
12:00-13:00 HOUR	0.0209	0.0207
13:00-14:00 HOUR	0.0217	0.0216
14:00-15:00 HOUR	0.0199	0.0208
15:00-16:00 HOUR	0.0214	0.0202
16:00-17:00 HOUR	0.0206	0.0213
17:00-18:00 HOUR	0.0208	0.0210
18:00-19:00 HOUR	0.0199	0.0197
19:00-20:00 HOUR	0.0174	0.0211
20:00-21:00 HOUR	0.0177	0.0206
21:00-22:00 HOUR	0.0181	0.0201
22:00-23:00 HOUR	0.0179	0.0186
23:00-00:00 HOUR	0.0184	0.0175
00:00-01:00 HOUR	0.0171	0.0184
01:00-02:00 HOUR	0.0201	0.0175
02:00-03:00 HOUR	0.0198	0.0168
03:00-04:00 HOUR	0.0165	0.0175
04:00-05:00 HOUR	0.0192	0.0192
05:00-06:00 HOUR	0.0223	0.0181
06:00-07:00 HOUR	0.0223	0.0188

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TIME *	RESULT (ppm)	
	DECEMBER 18-19, 2022 T22A2500-0004	DECEMBER 20-21, 2022 T22A2500-0005
07:00-08:00 HOUR	0.0178	0.0220
08:00-09:00 HOUR	0.0189	0.0200
09:00-10:00 HOUR	0.0198	0.0207
10:00-11:00 HOUR	0.0216	0.0220
11:00-12:00 HOUR	0.0214	0.0213
12:00-13:00 HOUR	0.0223	0.0219
13:00-14:00 HOUR	0.0211	0.0230
14:00-15:00 HOUR	0.0219	0.0204
15:00-16:00 HOUR	0.0220	0.0193
16:00-17:00 HOUR	0.0213	0.0212
17:00-18:00 HOUR	0.0196	0.0226
18:00-19:00 HOUR	0.0219	0.0210
19:00-20:00 HOUR	0.0194	0.0225
20:00-21:00 HOUR	0.0205	0.0206
21:00-22:00 HOUR	0.0188	0.0192
22:00-23:00 HOUR	0.0165	0.0182
23:00-00:00 HOUR	0.0161	0.0176
00:00-01:00 HOUR	0.0196	0.0197
01:00-02:00 HOUR	0.0195	0.0181
02:00-03:00 HOUR	0.0177	0.0187
03:00-04:00 HOUR	0.0164	0.0175
04:00-05:00 HOUR	0.0174	0.0176
05:00-06:00 HOUR	0.0199	0.0190
06:00-07:00 HOUR	0.0200	0.0197

DECEMBER 20, 2022

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### ANALYSIS REPORT

**CUSTOMER NAME** : BANRAI ELECTRICITY GENERATING COMPANY LIMITED  
**ADDRESS** : 238 NARADHIN WAS RAJAMANGSIN ROAD CHONG NONSI YAN NAWA BANGKOK 10120  
**CONTACT INFORMATION** : TEL : 09 5992 6195 e-mail : Safety@lhaesak@hotmail.com  
**MEASURING PLACE** : Utility Room  
**MEASURING DATE** : DECEMBER 15-22, 2022  
**MEASURING TIME** : AMBIENT (AIR)  
**MEASURING METHOD** : \*  
**MEASURED BY** : \*  
**RECEIVED DATE** : DECEMBER 15-22, 2022  
**ANALYTICAL DATE** : DECEMBER 15-22, 2022  
**REPORT NO.** : 2022-4103676  
**WORK NO.** : 2022-005705  
**ANALYSIS NO.** : T22A2600-0008 - T22A2600-0014

TIME *	RESULT (ppm)	
	DECEMBER 15-16, 2022	DECEMBER 17-18, 2022
	T22A2600-0008	T22A2600-0009
	Utility Room	Utility Room
	DECEMBER 15-16, 2022	DECEMBER 17-18, 2022
	T22A2600-0008	T22A2600-0009
07:00-08:00 HOUR	0.0230	0.0253
08:00-09:00 HOUR	0.0253	0.0227
09:00-10:00 HOUR	0.0229	0.0246
10:00-11:00 HOUR	0.0231	0.0251
11:00-12:00 HOUR	0.0248	0.0242
12:00-13:00 HOUR	0.0242	0.0220
13:00-14:00 HOUR	0.0231	0.0249
14:00-15:00 HOUR	0.0243	0.0225
15:00-16:00 HOUR	0.0240	0.0230
16:00-17:00 HOUR	0.0233	0.0234
17:00-18:00 HOUR	0.0248	0.0251
18:00-19:00 HOUR	0.0248	0.0251
19:00-20:00 HOUR	0.0234	0.0254
20:00-21:00 HOUR	0.0212	0.0229
21:00-22:00 HOUR	0.0207	0.0249
22:00-23:00 HOUR	0.0177	0.0206
23:00-00:00 HOUR	0.0186	0.0203
00:00-01:00 HOUR	0.0195	0.0201
01:00-02:00 HOUR	0.0209	0.0150
02:00-03:00 HOUR	0.0210	0.0201
03:00-04:00 HOUR	0.0193	0.0185
04:00-05:00 HOUR	0.0177	0.0188
05:00-06:00 HOUR	0.0196	0.0202
06:00-07:00 HOUR	0.0179	0.0235

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TIME *	RESULT (ppm)		
	DECEMBER 19-20, 2022	DECEMBER 21-22, 2022	DECEMBER 23-24, 2022
	T22A2600-0011	T22A2600-0012	T22A2600-0013
	Utility Room	Utility Room	Utility Room
	DECEMBER 19-20, 2022	DECEMBER 21-22, 2022	DECEMBER 23-24, 2022
	T22A2600-0011	T22A2600-0012	T22A2600-0013
07:00-08:00 HOUR	0.0179	0.0239	0.0226
08:00-09:00 HOUR	0.0185	0.0239	0.0226
09:00-10:00 HOUR	0.0200	0.0232	0.0241
10:00-11:00 HOUR	0.0226	0.0244	0.0258
11:00-12:00 HOUR	0.0228	0.0257	0.0239
12:00-13:00 HOUR	0.0258	0.0231	0.0244
13:00-14:00 HOUR	0.0247	0.0234	0.0222
14:00-15:00 HOUR	0.0227	0.0249	0.0227
15:00-16:00 HOUR	0.0235	0.0236	0.0232
16:00-17:00 HOUR	0.0232	0.0221	0.0243
17:00-18:00 HOUR	0.0237	0.0226	0.0251
18:00-19:00 HOUR	0.0249	0.0226	0.0251
19:00-20:00 HOUR	0.0245	0.0253	0.0245
20:00-21:00 HOUR	0.0229	0.0255	0.0243
21:00-22:00 HOUR	0.0231	0.0254	0.0239
22:00-23:00 HOUR	0.0208	0.0246	0.0244
23:00-00:00 HOUR	0.0213	0.0227	0.0232
00:00-01:00 HOUR	0.0193	0.0213	0.0231
01:00-02:00 HOUR	0.0213	0.0209	0.0222
02:00-03:00 HOUR	0.0210	0.0197	0.0211
03:00-04:00 HOUR	0.0185	0.0180	0.0200
04:00-05:00 HOUR	0.0185	0.0205	0.0196
05:00-06:00 HOUR	0.0205	0.0200	0.0178
06:00-07:00 HOUR	0.0212	0.0217	0.0219

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### ANALYSIS REPORT

**CUSTOMER NAME** : BANRAI ELECTRICITY GENERATING COMPANY LIMITED  
**ADDRESS** : 238 NARADHIWAS RAJANAGARINDRA CHONG NONSI YAN NAWA BANGKOK 10120  
**CONTACT INFORMATION** : TEL : 09 5992 6995 e-mail : Safety@bseac.com  
**MEASURING PLACE** : ฐานวัดค่า (ฐานวัดค่าในหม้อไอน้ำ)  
**MEASURING DATE** : DECEMBER 15-22, 2022  
**MEASURING TIME** : ANIENT (AIR)  
**MEASURING METHOD** : 2022-097705  
**MEASURED BY** : T2A2600-0001 - T2A2600-0007

ITEM #	RESULT (ppm)		
	SULPHUR DIOXIDE		
	DECEMBER 15-16, 2022	DECEMBER 17-18, 2022	DECEMBER 19-21, 2022
	T2A2600-0001	T2A2600-0002	T2A2600-0003
07:00-08:00 HOUR	0.0030	0.0029	0.0030
08:00-09:00 HOUR	0.0036	0.0031	0.0035
09:00-10:00 HOUR	0.0030	0.0030	0.0030
10:00-11:00 HOUR	0.0036	0.0034	0.0031
11:00-12:00 HOUR	0.0030	0.0037	0.0035
12:00-13:00 HOUR	0.0031	0.0036	0.0037
13:00-14:00 HOUR	0.0038	0.0033	0.0034
14:00-15:00 HOUR	0.0037	0.0038	0.0035
15:00-16:00 HOUR	0.0031	0.0031	0.0030
16:00-17:00 HOUR	0.0036	0.0036	0.0034
17:00-18:00 HOUR	0.0033	0.0036	0.0033
18:00-19:00 HOUR	0.0032	0.0034	0.0033
19:00-20:00 HOUR	0.0030	0.0036	0.0035
20:00-21:00 HOUR	0.0032	0.0035	0.0034
21:00-22:00 HOUR	0.0031	0.0031	0.0031
22:00-23:00 HOUR	0.0029	0.0029	0.0029
23:00-00:00 HOUR	0.0028	0.0027	0.0027
00:00-01:00 HOUR	0.0029	0.0028	0.0028
01:00-02:00 HOUR	0.0024	0.0027	0.0024
02:00-03:00 HOUR	0.0026	0.0025	0.0025
03:00-04:00 HOUR	0.0025	0.0025	0.0025
04:00-05:00 HOUR	0.0025	0.0027	0.0028
05:00-06:00 HOUR	0.0025	0.0026	0.0027
06:00-07:00 HOUR	0.0026	0.0028	0.0027
AVERAGE 24 HOUR	0.0031	0.0031	0.0031

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ITEM #	RESULT (ppm)		
	SULPHUR DIOXIDE		
	DECEMBER 15-16, 2022	DECEMBER 17-18, 2022	DECEMBER 19-21, 2022
	T2A2600-0004	T2A2600-0005	T2A2600-0006
07:00-08:00 HOUR	0.0024	0.0031	0.0035
08:00-09:00 HOUR	0.0026	0.0033	0.0029
09:00-10:00 HOUR	0.0028	0.0034	0.0031
10:00-11:00 HOUR	0.0031	0.0032	0.0032
11:00-12:00 HOUR	0.0033	0.0032	0.0034
12:00-13:00 HOUR	0.0035	0.0038	0.0035
13:00-14:00 HOUR	0.0031	0.0037	0.0034
14:00-15:00 HOUR	0.0038	0.0038	0.0035
15:00-16:00 HOUR	0.0032	0.0037	0.0031
16:00-17:00 HOUR	0.0032	0.0037	0.0030
17:00-18:00 HOUR	0.0032	0.0031	0.0033
18:00-19:00 HOUR	0.0031	0.0035	0.0032
19:00-20:00 HOUR	0.0030	0.0032	0.0036
20:00-21:00 HOUR	0.0029	0.0035	0.0038
21:00-22:00 HOUR	0.0028	0.0032	0.0031
22:00-23:00 HOUR	0.0028	0.0032	0.0029
23:00-00:00 HOUR	0.0026	0.0031	0.0026
00:00-01:00 HOUR	0.0029	0.0029	0.0024
01:00-02:00 HOUR	0.0025	0.0028	0.0024
02:00-03:00 HOUR	0.0027	0.0028	0.0028
03:00-04:00 HOUR	0.0025	0.0027	0.0027
04:00-05:00 HOUR	0.0024	0.0024	0.0029
05:00-06:00 HOUR	0.0027	0.0028	0.0031
06:00-07:00 HOUR	0.0029	0.0024	0.0032
AVERAGE 24 HOUR	0.0029	0.0032	0.0031

DECEMBER 28, 2022

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## ANALYSIS REPORT

**CUSTOMER NAME** : BANPAI ELECTRICITY GENERATING COMPANY LIMITED  
**ADDRESS** : 238 HARACHINDRA RAJAHAGARINDA CHONG MONSI YAN NAWA BANGKOK 10120  
**CONTACT INFORMATION** : TEL : 09 5992 6395 E-mail : Safetydiesel@hotmail.com  
**MEASURING PLACE** : 31461543  
**MEASURING TYPE** : AMBIENT (AIR)  
**MEASURING DATE** : DECEMBER 15-22, 2022  
**MEASURING TIME** : DECEMBER 15-22, 2022  
**MEASURING METHOD** : 2022-009705  
**MEASURED BY** : T222580-0008 - T222580-0014

DATE	TIME	SULPHUR DIOXIDE	
		DECEMBER 15-16, 2022 T222580-0008	DECEMBER 17-18, 2022 T222580-0014
07:00-08:00 HOUR		0.0034	0.0039
08:00-09:00 HOUR		0.0040	0.0042
09:00-10:00 HOUR		0.0039	0.0041
10:00-11:00 HOUR		0.0040	0.0039
11:00-12:00 HOUR		0.0038	0.0037
12:00-13:00 HOUR		0.0036	0.0041
13:00-14:00 HOUR		0.0037	0.0039
14:00-15:00 HOUR		0.0038	0.0035
15:00-16:00 HOUR		0.0037	0.0040
16:00-17:00 HOUR		0.0036	0.0038
17:00-18:00 HOUR		0.0035	0.0039
18:00-19:00 HOUR		0.0031	0.0038
19:00-20:00 HOUR		0.0028	0.0037
20:00-21:00 HOUR		0.0027	0.0034
21:00-22:00 HOUR		0.0025	0.0032
22:00-23:00 HOUR		0.0025	0.0029
23:00-00:00 HOUR		0.0027	0.0028
00:00-01:00 HOUR		0.0026	0.0027
01:00-02:00 HOUR		0.0025	0.0026
02:00-03:00 HOUR		0.0024	0.0025
03:00-04:00 HOUR		0.0024	0.0025
04:00-05:00 HOUR		0.0021	0.0025
05:00-06:00 HOUR		0.0032	0.0024
06:00-07:00 HOUR		0.0033	0.0029
AVERAGE 24 HOUR		0.0032	0.0034

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DATE	TIME	SULPHUR DIOXIDE	
		DECEMBER 19-20, 2022 T222580-0011	DECEMBER 21-22, 2022 T222580-0012
07:00-08:00 HOUR		0.0028	0.0029
08:00-09:00 HOUR		0.0030	0.0032
09:00-10:00 HOUR		0.0031	0.0031
10:00-11:00 HOUR		0.0034	0.0035
11:00-12:00 HOUR		0.0033	0.0037
12:00-13:00 HOUR		0.0032	0.0038
13:00-14:00 HOUR		0.0035	0.0034
14:00-15:00 HOUR		0.0036	0.0035
15:00-16:00 HOUR		0.0034	0.0034
16:00-17:00 HOUR		0.0042	0.0033
17:00-18:00 HOUR		0.0033	0.0031
18:00-19:00 HOUR		0.0034	0.0042
19:00-20:00 HOUR		0.0035	0.0033
20:00-21:00 HOUR		0.0031	0.0035
21:00-22:00 HOUR		0.0029	0.0034
22:00-23:00 HOUR		0.0026	0.0032
23:00-00:00 HOUR		0.0025	0.0030
00:00-01:00 HOUR		0.0028	0.0028
01:00-02:00 HOUR		0.0028	0.0026
02:00-03:00 HOUR		0.0028	0.0027
03:00-04:00 HOUR		0.0024	0.0029
04:00-05:00 HOUR		0.0025	0.0030
05:00-06:00 HOUR		0.0026	0.0032
06:00-07:00 HOUR		0.0028	0.0039
AVERAGE 24 HOUR		0.0031	0.0033

DECEMBER 28, 2022

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## ANALYSIS REPORT

**CUSTOMER NAME** : BANJAN ELECTRICITY GENERATING COMPANY LIMITED  
**ADDRESS** : 238 BANGKADITWAS BANGKADITWAS CHONG NONGSI YAN NAWA BANGKOK 10120  
**CONTACT INFORMATION** : TEL : 09 5902 6395 e-mail : Safety@uaec.com  
**MEASURING PLACE** : AMBIENT (AIR)  
**MEASURING DATE** : DECEMBER 15-22, 2022  
**MEASURING TIME** : \*  
**MEASURING METHOD** : WIND SPEED & WIND DIRECTION EQUIPMENT  
**MEASURED BY** : [REDACTED]

**RECEIVED DATE** : DECEMBER 15-22, 2022  
**ANALYTICAL DATE** : DECEMBER 15-22, 2022  
**REPORT NO.** : 2022-U03681  
**WORK NO.** : 2022-009705  
**ANALYSIS NO.** : T22A2600-0008 - T22A2600-0019

TIME *	RESULT (m/s)			
	DECEMBER 15-16, 2022		DECEMBER 17-18, 2022	
	WIND SPEED	WIND DIRECTION	WIND SPEED	WIND DIRECTION
07:00-08:00 HOUR	0.6	N	0.4	ENE
08:00-09:00 HOUR	0.9	NE	0.9	ENE
09:00-10:00 HOUR	1.1	NNE	1.4	NNE
10:00-11:00 HOUR	0.3	NNE	0.3	NE
11:00-12:00 HOUR	0.6	E	1.2	NE
12:00-13:00 HOUR	1.4	NNE	1.1	NNE
13:00-14:00 HOUR	2.0	ENE	0.3	NE
14:00-15:00 HOUR	1.1	NNE	3.2	E
15:00-16:00 HOUR	1.8	NE	1.5	NNE
16:00-17:00 HOUR	0.5	N	0.7	ENE
17:00-18:00 HOUR	1.8	NE	0.9	NE
18:00-19:00 HOUR	1.1	ENE	3.4	NE
19:00-20:00 HOUR	0.3	NNE	3.3	NE
20:00-21:00 HOUR	2.5	NNE	1.8	ENE
21:00-22:00 HOUR	0.8	E	0.8	ENE
22:00-23:00 HOUR	1.1	NNE	0.9	NNE
23:00-00:00 HOUR	1.7	NE	1.7	NNE
00:00-01:00 HOUR	2.7	NE	1.1	ENE
01:00-02:00 HOUR	3.3	NE	2.4	E
02:00-03:00 HOUR	0.8	ENE	1.6	N
03:00-04:00 HOUR	2.0	NE	0.4	E
04:00-05:00 HOUR	0.8	N	2.3	N
05:00-06:00 HOUR	2.1	NNE	1.7	NE
06:00-07:00 HOUR	0.7	NNE	3.1	E

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## RESULT (m/s)

TIME *	DECEMBER 19-20, 2022			
	WIND SPEED	WIND DIRECTION	WIND SPEED	WIND DIRECTION
	WIND SPEED	WIND DIRECTION	WIND SPEED	WIND DIRECTION
07:00-08:00 HOUR	1.5	NE	0.4	ENE
08:00-09:00 HOUR	1.1	NNE	1.1	NE
09:00-10:00 HOUR	3.0	NNE	3.4	E
10:00-11:00 HOUR	3.4	NE	3.3	NNE
11:00-12:00 HOUR	0.9	NE	0.7	NE
12:00-13:00 HOUR	1.5	E	1.4	NE
13:00-14:00 HOUR	3.4	ENE	0.6	NNE
14:00-15:00 HOUR	0.4	NNE	0.3	NNE
15:00-16:00 HOUR	2.4	NE	2.8	NE
16:00-17:00 HOUR	2.2	NNE	3.2	E
17:00-18:00 HOUR	0.3	NNE	3.2	NE
18:00-19:00 HOUR	2.8	ENE	2.1	NE
19:00-20:00 HOUR	0.8	NE	0.9	NNE
20:00-21:00 HOUR	0.6	N	1.3	E
21:00-22:00 HOUR	0.5	NE	0.8	NE
22:00-23:00 HOUR	0.6	NE	2.8	E
23:00-00:00 HOUR	0.9	N	2.5	ENE
00:00-01:00 HOUR	2.9	E	2.0	E
01:00-02:00 HOUR	1.6	ENE	2.3	NNE
02:00-03:00 HOUR	2.9	NNE	3.2	NE
03:00-04:00 HOUR	2.6	NNE	1.9	ENE
04:00-05:00 HOUR	1.9	NE	2.2	NNE
05:00-06:00 HOUR	0.7	NNE	3.4	ENE
06:00-07:00 HOUR	2.9	ENE		

DECEMBER 20, 2022

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### ANALYSIS REPORT

CUSTOMER NAME : BANRAI ELECTRICITY GENERATING COMPANY LIMITED  
ADDRESS : 111 MOO 12 THAP LUANG BAN RAI UTHAI THANI 61140  
CONTACT INFORMATION : TEL : 09 5992 6395 e-mail : Safety@raeak@bomail.com  
MEASURING PLACE : *unlabeled*  
MEASURING TYPE : AMBIENT (ANNOYANCE NOISE)  
MEASURING DATE : JULY 24-27, 2022  
MEASURING TIME : *a*  
MEASURING EQUIPMENT : INTEGRATED SOUND LEVEL METER AND CALCULATION  
MEASURED BY : *[redacted]*

RECEIVED DATE : JULY 24-27, 2022  
ANALYTICAL DATE : JULY 24-27, 2022  
REPORT NO. : 2022-006000  
WORK NO. : 2022-000024  
ANALYSIS NO. : T22A0951-0001 • T22A0951-0003

DATE	TIME*	RESULT (dB(A))			
		SPECIFIC NOISE LEVEL	RESIDUAL NOISE LEVEL	SPECIFIC NOISE LEVEL (IMPROVE NOISE LEVEL)	ANNOYANCE NOISE LEVEL
JULY 24, 2022 T22A0951-0001	DAY TIME <sup>1/</sup>				
	07:00-08:00 HOUR	44.2 <sup>1/</sup>	42.4 <sup>1/</sup>	39.7 <sup>1/</sup>	NOT SIGNIFICANT <sup>2/</sup>
	08:00-09:00 HOUR	42.9 <sup>1/</sup>	42.4 <sup>1/</sup>	35.9 <sup>1/</sup>	NOT SIGNIFICANT <sup>2/</sup>
	09:00-10:00 HOUR	42.6 <sup>1/</sup>	42.4 <sup>1/</sup>	35.6 <sup>1/</sup>	NOT SIGNIFICANT <sup>2/</sup>
	10:00-11:00 HOUR	43.5 <sup>1/</sup>	42.4 <sup>1/</sup>	36.9 <sup>1/</sup>	NOT SIGNIFICANT <sup>2/</sup>
	11:00-12:00 HOUR	44.5 <sup>1/</sup>	42.4 <sup>1/</sup>	40.1 <sup>1/</sup>	NOT SIGNIFICANT <sup>2/</sup>
	12:00-13:00 HOUR	42.5 <sup>1/</sup>	42.4 <sup>1/</sup>	35.5 <sup>1/</sup>	NOT SIGNIFICANT <sup>2/</sup>
	13:00-14:00 HOUR	44.5 <sup>1/</sup>	42.4 <sup>1/</sup>	40.0 <sup>1/</sup>	NOT SIGNIFICANT <sup>2/</sup>
	14:00-15:00 HOUR	47.5 <sup>1/</sup>	42.4 <sup>1/</sup>	46.0 <sup>1/</sup>	5.8
	15:00-16:00 HOUR	47.5 <sup>1/</sup>	42.4 <sup>1/</sup>	46.1 <sup>1/</sup>	5.9
	16:00-17:00 HOUR	47.5 <sup>1/</sup>	42.4 <sup>1/</sup>	46.0 <sup>1/</sup>	5.8
	17:00-18:00 HOUR	45.5 <sup>1/</sup>	42.4 <sup>1/</sup>	42.6 <sup>1/</sup>	2.4
	18:00-19:00 HOUR	44.4 <sup>1/</sup>	42.4 <sup>1/</sup>	35.9 <sup>1/</sup>	NOT SIGNIFICANT <sup>2/</sup>
	19:00-20:00 HOUR	47.1 <sup>1/</sup>	42.4 <sup>1/</sup>	45.6 <sup>1/</sup>	5.4
	20:00-21:00 HOUR	46.9 <sup>1/</sup>	42.4 <sup>1/</sup>	45.4 <sup>1/</sup>	5.2
	21:00-22:00 HOUR	47.2 <sup>1/</sup>	42.4 <sup>1/</sup>	45.7 <sup>1/</sup>	5.5
JULY 25, 2022 T22A0951-0001	NIGHT TIME <sup>1/</sup>				
	22:00-22:05 HOUR	43.8 <sup>1/</sup>	42.2 <sup>1/</sup>	42.3 <sup>1/</sup>	2.3
	22:05-22:10 HOUR	43.6 <sup>1/</sup>	42.2 <sup>1/</sup>	39.6 <sup>1/</sup>	NOT SIGNIFICANT <sup>2/</sup>
	22:10-22:15 HOUR	44.0 <sup>1/</sup>	42.2 <sup>1/</sup>	42.5 <sup>1/</sup>	2.5
	22:15-22:20 HOUR	45.1 <sup>1/</sup>	42.2 <sup>1/</sup>	45.1 <sup>1/</sup>	5.1
	22:20-22:25 HOUR	46.0 <sup>1/</sup>	42.2 <sup>1/</sup>	47.0 <sup>1/</sup>	7.0
	22:25-22:30 HOUR	44.7 <sup>1/</sup>	42.2 <sup>1/</sup>	44.7 <sup>1/</sup>	4.7
	22:30-22:35 HOUR	44.9 <sup>1/</sup>	42.2 <sup>1/</sup>	44.9 <sup>1/</sup>	4.9
	22:35-22:40 HOUR	44.0 <sup>1/</sup>	42.2 <sup>1/</sup>	42.5 <sup>1/</sup>	2.5
	22:40-22:45 HOUR	43.4 <sup>1/</sup>	42.2 <sup>1/</sup>	39.4 <sup>1/</sup>	NOT SIGNIFICANT <sup>2/</sup>
	22:45-22:50 HOUR	43.0 <sup>1/</sup>	42.2 <sup>1/</sup>	39.0 <sup>1/</sup>	NOT SIGNIFICANT <sup>2/</sup>
	22:50-22:55 HOUR	45.3 <sup>1/</sup>	42.2 <sup>1/</sup>	45.3 <sup>1/</sup>	5.3
	22:55-23:00 HOUR	46.0 <sup>1/</sup>	42.2 <sup>1/</sup>	47.0 <sup>1/</sup>	7.0
	23:00-23:05 HOUR	43.2 <sup>1/</sup>	42.2 <sup>1/</sup>	39.2 <sup>1/</sup>	2.6
	23:05-23:10 HOUR	44.1 <sup>1/</sup>	42.2 <sup>1/</sup>	42.6 <sup>1/</sup>	2.6
	23:10-23:15 HOUR	44.3 <sup>1/</sup>	42.2 <sup>1/</sup>	42.8 <sup>1/</sup>	2.8
JULY 26, 2022 T22A0951-0001	23:15-23:20 HOUR	45.7 <sup>1/</sup>	42.2 <sup>1/</sup>	46.7 <sup>1/</sup>	6.7
	23:20-23:25 HOUR	44.9 <sup>1/</sup>	42.2 <sup>1/</sup>	44.9 <sup>1/</sup>	4.9

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DATE	TIME*	RESULT (dB(A))			
		SPECIFIC NOISE LEVEL	RESIDUAL NOISE LEVEL	SPECIFIC NOISE LEVEL (IMPROVE NOISE LEVEL)	ANNOYANCE NOISE LEVEL
JULY 24, 2022 T22A0951-0001	NIGHT TIME <sup>1/</sup>				
	23:25-23:30 HOUR	43.2 <sup>1/</sup>	42.2 <sup>1/</sup>	39.2 <sup>1/</sup>	NOT SIGNIFICANT <sup>2/</sup>
	23:30-23:35 HOUR	44.0 <sup>1/</sup>	42.2 <sup>1/</sup>	42.5 <sup>1/</sup>	2.5
	23:35-23:40 HOUR	42.8 <sup>1/</sup>	42.2 <sup>1/</sup>	36.8 <sup>1/</sup>	NOT SIGNIFICANT <sup>2/</sup>
	23:40-23:45 HOUR	43.8 <sup>1/</sup>	42.2 <sup>1/</sup>	42.3 <sup>1/</sup>	2.3
	23:45-23:50 HOUR	42.7 <sup>1/</sup>	42.2 <sup>1/</sup>	36.7 <sup>1/</sup>	NOT SIGNIFICANT <sup>2/</sup>
	23:50-23:55 HOUR	44.0 <sup>1/</sup>	42.2 <sup>1/</sup>	42.5 <sup>1/</sup>	2.5
	23:55-00:00 HOUR	44.5 <sup>1/</sup>	42.2 <sup>1/</sup>	43.0 <sup>1/</sup>	3.0
	NIGHT TIME <sup>1/</sup>				
	00:00-00:05 HOUR	43.4 <sup>1/</sup>	42.2 <sup>1/</sup>	39.4 <sup>1/</sup>	NOT SIGNIFICANT <sup>2/</sup>
	00:05-00:10 HOUR	43.3 <sup>1/</sup>	42.2 <sup>1/</sup>	39.3 <sup>1/</sup>	NOT SIGNIFICANT <sup>2/</sup>
	00:10-00:15 HOUR	43.0 <sup>1/</sup>	42.2 <sup>1/</sup>	39.0 <sup>1/</sup>	NOT SIGNIFICANT <sup>2/</sup>
	00:15-00:20 HOUR	43.0 <sup>1/</sup>	42.2 <sup>1/</sup>	39.0 <sup>1/</sup>	NOT SIGNIFICANT <sup>2/</sup>
	00:20-00:25 HOUR	44.2 <sup>1/</sup>	42.2 <sup>1/</sup>	42.7 <sup>1/</sup>	2.7
	00:25-00:30 HOUR	45.3 <sup>1/</sup>	42.2 <sup>1/</sup>	45.2 <sup>1/</sup>	5.2
	00:30-00:35 HOUR	46.5 <sup>1/</sup>	42.2 <sup>1/</sup>	47.5 <sup>1/</sup>	7.5
JULY 25, 2022 T22A0951-0001	00:35-00:40 HOUR	46.7 <sup>1/</sup>	42.2 <sup>1/</sup>	48.2 <sup>1/</sup>	8.2
	00:40-00:45 HOUR	46.7 <sup>1/</sup>	42.2 <sup>1/</sup>	48.2 <sup>1/</sup>	8.2
	00:45-00:50 HOUR	46.8 <sup>1/</sup>	42.2 <sup>1/</sup>	48.3 <sup>1/</sup>	8.3
	00:50-00:55 HOUR	46.5 <sup>1/</sup>	42.2 <sup>1/</sup>	47.5 <sup>1/</sup>	7.5
	00:55-01:00 HOUR	46.5 <sup>1/</sup>	42.2 <sup>1/</sup>	47.5 <sup>1/</sup>	7.5
	01:00-01:05 HOUR	46.6 <sup>1/</sup>	42.2 <sup>1/</sup>	45.6 <sup>1/</sup>	5.6
	01:05-01:10 HOUR	46.5 <sup>1/</sup>	42.2 <sup>1/</sup>	45.5 <sup>1/</sup>	5.5
	01:10-01:15 HOUR	46.7 <sup>1/</sup>	42.2 <sup>1/</sup>	45.7 <sup>1/</sup>	5.7
	01:15-01:20 HOUR	44.9 <sup>1/</sup>	42.2 <sup>1/</sup>	44.9 <sup>1/</sup>	4.9
	01:20-01:25 HOUR	44.4 <sup>1/</sup>	42.2 <sup>1/</sup>	42.9 <sup>1/</sup>	2.9
	01:25-01:30 HOUR	44.1 <sup>1/</sup>	42.2 <sup>1/</sup>	42.6 <sup>1/</sup>	2.6
	01:30-01:35 HOUR	43.9 <sup>1/</sup>	42.2 <sup>1/</sup>	42.4 <sup>1/</sup>	2.4
	01:35-01:40 HOUR	44.6 <sup>1/</sup>	42.2 <sup>1/</sup>	43.1 <sup>1/</sup>	3.1
	01:40-01:45 HOUR	43.8 <sup>1/</sup>	42.2 <sup>1/</sup>	42.3 <sup>1/</sup>	2.3
	01:45-01:50 HOUR	43.7 <sup>1/</sup>	42.2 <sup>1/</sup>	42.2 <sup>1/</sup>	2.2
	01:50-01:55 HOUR	43.6 <sup>1/</sup>	42.2 <sup>1/</sup>	39.6 <sup>1/</sup>	NOT SIGNIFICANT <sup>2/</sup>
JULY 26, 2022 T22A0951-0001	01:55-02:00 HOUR	43.0 <sup>1/</sup>	42.2 <sup>1/</sup>	39.0 <sup>1/</sup>	NOT SIGNIFICANT <sup>2/</sup>
	02:00-02:05 HOUR	42.8 <sup>1/</sup>	42.2 <sup>1/</sup>	38.8 <sup>1/</sup>	NOT SIGNIFICANT <sup>2/</sup>
	02:05-02:10 HOUR	42.9 <sup>1/</sup>	42.2 <sup>1/</sup>	38.9 <sup>1/</sup>	NOT SIGNIFICANT <sup>2/</sup>
	02:10-02:15 HOUR	43.2 <sup>1/</sup>	42.2 <sup>1/</sup>	39.2 <sup>1/</sup>	NOT SIGNIFICANT <sup>2/</sup>
	02:15-02:20 HOUR	43.9 <sup>1/</sup>	42.2 <sup>1/</sup>	42.4 <sup>1/</sup>	2.4
	02:20-02:25 HOUR	44.0 <sup>1/</sup>	42.2 <sup>1/</sup>	42.5 <sup>1/</sup>	2.5
	02:25-02:30 HOUR	46.7 <sup>1/</sup>	42.2 <sup>1/</sup>	46.7 <sup>1/</sup>	6.7
	02:30-02:35 HOUR	44.8 <sup>1/</sup>	42.2 <sup>1/</sup>	44.8 <sup>1/</sup>	4.8
	02:35-02:40 HOUR	44.3 <sup>1/</sup>	42.2 <sup>1/</sup>	42.8 <sup>1/</sup>	2.8
	02:40-02:45 HOUR	44.1 <sup>1/</sup>	42.2 <sup>1/</sup>	42.6 <sup>1/</sup>	2.6
	02:45-02:50 HOUR	44.1 <sup>1/</sup>	42.2 <sup>1/</sup>	42.6 <sup>1/</sup>	2.6
	02:50-02:55 HOUR	44.0 <sup>1/</sup>	42.2 <sup>1/</sup>	42.5 <sup>1/</sup>	2.5
	02:55-03:00 HOUR	42.6 <sup>1/</sup>	42.2 <sup>1/</sup>	38.6 <sup>1/</sup>	NOT SIGNIFICANT <sup>2/</sup>
	03:00-03:05 HOUR	42.5 <sup>1/</sup>	42.2 <sup>1/</sup>	38.5 <sup>1/</sup>	NOT SIGNIFICANT <sup>2/</sup>
	03:05-03:10 HOUR	42.5 <sup>1/</sup>	42.2 <sup>1/</sup>	38.5 <sup>1/</sup>	NOT SIGNIFICANT <sup>2/</sup>
	03:10-03:15 HOUR	42.5 <sup>1/</sup>	42.2 <sup>1/</sup>	38.5 <sup>1/</sup>	NOT SIGNIFICANT <sup>2/</sup>

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DATE	TIME#	RESULT (dB(A))			
		1700h-1730h			
		SPECIFIC NOISE LEVEL	RESIDUAL NOISE LEVEL	SPECIFIC NOISE LEVEL (IMPROVE NOISE LEVEL)	BACKGROUND NOISE LEVEL
JULY 26, 2022 T22A0951-0002	NIGHT TIME #				
	00:55-01:00 HOUR	44.7 <sup>h</sup>	42.3 <sup>h</sup> ***	43.2 <sup>h</sup>	41.2 <sup>h</sup> ***
	01:00-01:05 HOUR	46.1 <sup>h</sup>	42.3 <sup>h</sup> ***	45.1 <sup>h</sup>	41.2 <sup>h</sup> ***
	01:05-01:10 HOUR	48.3 <sup>h</sup>	42.3 <sup>h</sup> ***	46.3 <sup>h</sup>	41.2 <sup>h</sup> ***
	01:10-01:15 HOUR	45.1 <sup>h</sup>	42.3 <sup>h</sup> ***	45.1 <sup>h</sup>	41.2 <sup>h</sup> ***
	01:15-01:20 HOUR	44.4 <sup>h</sup>	42.3 <sup>h</sup> ***	42.3 <sup>h</sup>	41.2 <sup>h</sup> ***
	01:20-01:25 HOUR	44.1 <sup>h</sup>	42.3 <sup>h</sup> ***	42.6 <sup>h</sup>	41.2 <sup>h</sup> ***
	01:25-01:30 HOUR	44.6 <sup>h</sup>	42.3 <sup>h</sup> ***	43.1 <sup>h</sup>	41.2 <sup>h</sup> ***
	01:30-01:35 HOUR	44.6 <sup>h</sup>	42.3 <sup>h</sup> ***	43.1 <sup>h</sup>	41.2 <sup>h</sup> ***
	01:35-01:40 HOUR	43.6 <sup>h</sup>	42.3 <sup>h</sup> ***	39.6 <sup>h</sup>	41.2 <sup>h</sup> ***
	01:40-01:45 HOUR	44.4 <sup>h</sup>	42.3 <sup>h</sup> ***	42.9 <sup>h</sup>	41.2 <sup>h</sup> ***
	01:45-01:50 HOUR	44.2 <sup>h</sup>	42.3 <sup>h</sup> ***	42.7 <sup>h</sup>	41.2 <sup>h</sup> ***
	01:50-01:55 HOUR	43.4 <sup>h</sup>	42.3 <sup>h</sup> ***	39.0 <sup>h</sup>	41.2 <sup>h</sup> ***
	01:55-02:00 HOUR	43.0 <sup>h</sup>	42.3 <sup>h</sup> ***	38.5 <sup>h</sup>	41.2 <sup>h</sup> ***
	02:00-02:05 HOUR	42.5 <sup>h</sup>	42.3 <sup>h</sup> ***	38.5 <sup>h</sup>	41.2 <sup>h</sup> ***
	02:05-02:10 HOUR	42.8 <sup>h</sup>	42.3 <sup>h</sup> ***	38.7 <sup>h</sup>	41.2 <sup>h</sup> ***
	02:10-02:15 HOUR	42.7 <sup>h</sup>	42.3 <sup>h</sup> ***	38.7 <sup>h</sup>	41.2 <sup>h</sup> ***
	02:15-02:20 HOUR	42.5 <sup>h</sup>	42.3 <sup>h</sup> ***	38.5 <sup>h</sup>	41.2 <sup>h</sup> ***
	02:20-02:25 HOUR	42.7 <sup>h</sup>	42.3 <sup>h</sup> ***	38.7 <sup>h</sup>	41.2 <sup>h</sup> ***
	02:25-02:30 HOUR	42.9 <sup>h</sup>	42.3 <sup>h</sup> ***	38.9 <sup>h</sup>	41.2 <sup>h</sup> ***
	02:30-02:35 HOUR	42.8 <sup>h</sup>	42.3 <sup>h</sup> ***	38.8 <sup>h</sup>	41.2 <sup>h</sup> ***
	02:35-02:40 HOUR	41.3 <sup>h</sup>	42.3 <sup>h</sup> ***	38.3 <sup>h</sup>	41.2 <sup>h</sup> ***
	02:40-02:45 HOUR	43.0 <sup>h</sup>	42.3 <sup>h</sup> ***	38.0 <sup>h</sup>	41.2 <sup>h</sup> ***
	02:45-02:50 HOUR	41.4 <sup>h</sup>	42.3 <sup>h</sup> ***	38.4 <sup>h</sup>	41.2 <sup>h</sup> ***
	02:50-02:55 HOUR	43.9 <sup>h</sup>	42.3 <sup>h</sup> ***	42.4 <sup>h</sup>	41.2 <sup>h</sup> ***
	02:55-03:00 HOUR	43.5 <sup>h</sup>	42.3 <sup>h</sup> ***	39.5 <sup>h</sup>	41.2 <sup>h</sup> ***
	03:00-03:05 HOUR	44.9 <sup>h</sup>	42.3 <sup>h</sup> ***	44.9 <sup>h</sup>	41.2 <sup>h</sup> ***
	03:05-03:10 HOUR	41.4 <sup>h</sup>	42.3 <sup>h</sup> ***	38.4 <sup>h</sup>	41.2 <sup>h</sup> ***
	03:10-03:15 HOUR	45.2 <sup>h</sup>	42.3 <sup>h</sup> ***	45.2 <sup>h</sup>	41.2 <sup>h</sup> ***
	03:15-03:20 HOUR	43.5 <sup>h</sup>	42.3 <sup>h</sup> ***	38.5 <sup>h</sup>	41.2 <sup>h</sup> ***
	03:20-03:25 HOUR	43.9 <sup>h</sup>	42.3 <sup>h</sup> ***	42.4 <sup>h</sup>	41.2 <sup>h</sup> ***
	03:25-03:30 HOUR	43.2 <sup>h</sup>	42.3 <sup>h</sup> ***	39.2 <sup>h</sup>	41.2 <sup>h</sup> ***
03:30-03:35 HOUR	44.3 <sup>h</sup>	42.3 <sup>h</sup> ***	42.5 <sup>h</sup>	41.2 <sup>h</sup> ***	
03:35-03:40 HOUR	44.3 <sup>h</sup>	42.3 <sup>h</sup> ***	42.8 <sup>h</sup>	41.2 <sup>h</sup> ***	
03:40-03:45 HOUR	46.2 <sup>h</sup>	42.3 <sup>h</sup> ***	47.2 <sup>h</sup>	41.2 <sup>h</sup> ***	
03:45-03:50 HOUR	47.2 <sup>h</sup>	42.3 <sup>h</sup> ***	48.7 <sup>h</sup>	41.2 <sup>h</sup> ***	
03:50-03:55 HOUR	48.0 <sup>h</sup>	42.3 <sup>h</sup> ***	49.5 <sup>h</sup>	41.2 <sup>h</sup> ***	
03:55-04:00 HOUR	46.2 <sup>h</sup>	42.3 <sup>h</sup> ***	47.2 <sup>h</sup>	41.2 <sup>h</sup> ***	
04:00-04:05 HOUR	46.4 <sup>h</sup>	42.3 <sup>h</sup> ***	47.4 <sup>h</sup>	41.2 <sup>h</sup> ***	
04:05-04:10 HOUR	46.6 <sup>h</sup>	42.3 <sup>h</sup> ***	47.6 <sup>h</sup>	41.2 <sup>h</sup> ***	
04:10-04:15 HOUR	48.5 <sup>h</sup>	42.3 <sup>h</sup> ***	50.0 <sup>h</sup>	41.2 <sup>h</sup> ***	
04:15-04:20 HOUR	47.6 <sup>h</sup>	42.3 <sup>h</sup> ***	49.1 <sup>h</sup>	41.2 <sup>h</sup> ***	
04:20-04:25 HOUR	47.9 <sup>h</sup>	42.3 <sup>h</sup> ***	49.4 <sup>h</sup>	41.2 <sup>h</sup> ***	
04:25-04:30 HOUR	47.6 <sup>h</sup>	42.3 <sup>h</sup> ***	49.1 <sup>h</sup>	41.2 <sup>h</sup> ***	
04:30-04:35 HOUR	47.9 <sup>h</sup>	42.3 <sup>h</sup> ***	49.4 <sup>h</sup>	41.2 <sup>h</sup> ***	
04:35-04:40 HOUR	48.3 <sup>h</sup>	42.3 <sup>h</sup> ***	49.8 <sup>h</sup>	41.2 <sup>h</sup> ***	

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008094M-2202

DATE	TIME	RESULT (dBA)					
		1/10/2019					
		SPECIFIC NOISE LEVEL	RESIDUAL NOISE LEVEL	SPECIFIC NOISE LEVEL (IMPROVE NOISE LEVEL)	BACKGROUND NOISE LEVEL	ANNOYANCE NOISE LEVEL	
JULY 30, 2022 T22A0951-0002	WAKE UP	47.2	42.3	48.2	41.2	7.5	
	04:45-04:55 HOUR	47.4	42.3	48.9	41.2	7.7	
	04:50-04:55 HOUR	47.0	42.3	48.5	41.2	7.3	
	04:55-05:00 HOUR	46.8	42.3	48.3	41.2	7.1	
	05:00-05:05 HOUR	44.9	42.3	44.9	41.2	3.7	
	05:05-05:10 HOUR	43.3	42.3	39.3	41.2	NOT SIGNIFICANT	
	05:10-05:15 HOUR	43.5	42.3	39.5	41.2	NOT SIGNIFICANT	
	05:15-05:20 HOUR	43.6	42.3	39.8	41.2	NOT SIGNIFICANT	
	05:20-05:25 HOUR	42.9	42.3	38.9	41.2	NOT SIGNIFICANT	
	05:25-05:30 HOUR	43.4	42.3	39.4	41.2	NOT SIGNIFICANT	
	05:30-05:35 HOUR	42.5	42.3	38.5	41.2	NOT SIGNIFICANT	
	05:35-05:40 HOUR	43.6	42.3	39.6	41.2	NOT SIGNIFICANT	
	05:40-05:45 HOUR	46.8	42.3	46.8	41.2	5.6	
	05:45-05:50 HOUR	43.2	42.3	39.2	41.2	NOT SIGNIFICANT	
	05:50-05:55 HOUR	43.3	42.3	38.3	41.2	NOT SIGNIFICANT	
	05:55-06:00 HOUR	43.1	42.3	38.1	41.2	NOT SIGNIFICANT	
	DAY TIME						
	06:00-07:00 HOUR	45.0	43.5	40.3	41.8	NOT SIGNIFICANT	
	AUG 30, 2022 T22A0951-0003	DAY TIME					
		07:00-08:00 HOUR	44.6	42.9	40.1	41.2	NOT SIGNIFICANT
08:00-09:00 HOUR		45.0	42.9	40.5	41.2	NOT SIGNIFICANT	
09:00-10:00 HOUR		43.4	42.9	38.4	41.2	NOT SIGNIFICANT	
10:00-11:00 HOUR		43.7	42.9	38.7	41.2	NOT SIGNIFICANT	
11:00-12:00 HOUR		43.4	42.9	38.4	41.2	NOT SIGNIFICANT	
12:00-13:00 HOUR		44.2	42.9	37.2	41.2	NOT SIGNIFICANT	
13:00-14:00 HOUR		42.9	42.9	38.9	41.2	NOT SIGNIFICANT	
14:00-15:00 HOUR		45.4	42.9	42.4	41.2	1.2	
15:00-16:00 HOUR		43.6	42.9	38.6	41.2	NOT SIGNIFICANT	
16:00-17:00 HOUR		45.2	42.9	40.7	41.2	NOT SIGNIFICANT	
17:00-18:00 HOUR		45.3	42.9	40.8	41.2	NOT SIGNIFICANT	
18:00-19:00 HOUR		42.9	42.9	35.9	41.2	NOT SIGNIFICANT	
19:00-20:00 HOUR		43.5	42.9	38.5	41.2	NOT SIGNIFICANT	
20:00-21:00 HOUR		44.4	42.9	38.9	41.2	NOT SIGNIFICANT	
21:00-22:00 HOUR		44.1	42.9	37.1	41.2	NOT SIGNIFICANT	
NIGHT TIME							
22:00-22:05 HOUR		43.8	39.2	45.3	37.9	7.4	
22:05-22:10 HOUR		44.1	39.2	45.6	37.9	7.7	
22:10-22:15 HOUR		44.6	39.2	46.1	37.9	8.2	
22:15-22:20 HOUR	44.3	39.2	45.8	37.9	7.9		
22:20-22:25 HOUR	43.9	39.2	45.4	37.9	7.5		
22:25-22:30 HOUR	44.0	39.2	45.5	37.9	7.6		
22:30-22:35 HOUR	44.8	39.2	46.5	37.9	8.6		
22:35-22:40 HOUR	44.0	39.2	46.3	37.9	8.4		
22:40-22:45 HOUR	44.1	39.2	46.6	37.9	8.7		
22:45-22:50 HOUR	44.2	39.2	46.8	37.9	8.7		

NO MORE SINGLES  
NO MORE SINGLES

41.3	39.2	46.0	37.9
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6.9

5032-1006-0000





DATE	TIME	RESULT (dB(A))			
		SPECIFIC NOISE LEVEL	RESIDUAL NOISE LEVEL	SPECIFIC NOISE LEVEL (IMPROVE NOISE LEVEL)	ANNOYANCE NOISE LEVEL
JULY 26, 2022 T22A0951-0003	NIGHT TIME 2/				
	22:50-22:55 HOUR	44.6 <sup>2</sup>	39.2 <sup>1</sup>	46.1 <sup>2</sup>	8.2
	22:55-23:00 HOUR	44.2 <sup>2</sup>	39.2 <sup>1</sup>	45.7 <sup>2</sup>	7.8
	23:00-23:05 HOUR	44.4 <sup>2</sup>	39.2 <sup>1</sup>	45.9 <sup>2</sup>	8.0
	23:05-23:10 HOUR	44.2 <sup>2</sup>	39.2 <sup>1</sup>	45.7 <sup>2</sup>	7.8
	23:10-23:15 HOUR	43.9 <sup>2</sup>	39.2 <sup>1</sup>	45.4 <sup>2</sup>	7.5
	23:15-23:20 HOUR	43.9 <sup>2</sup>	39.2 <sup>1</sup>	45.4 <sup>2</sup>	7.5
	23:20-23:25 HOUR	44.5 <sup>2</sup>	39.2 <sup>1</sup>	46.0 <sup>2</sup>	8.1
	23:25-23:30 HOUR	44.1 <sup>2</sup>	39.2 <sup>1</sup>	45.6 <sup>2</sup>	7.7
	23:30-23:35 HOUR	42.5 <sup>2</sup>	39.2 <sup>1</sup>	42.5 <sup>2</sup>	4.6
	23:35-23:40 HOUR	42.2 <sup>2</sup>	39.2 <sup>1</sup>	42.2 <sup>2</sup>	4.3
	23:40-23:45 HOUR	42.2 <sup>2</sup>	39.2 <sup>1</sup>	42.2 <sup>2</sup>	4.3
	23:45-23:50 HOUR	42.5 <sup>2</sup>	39.2 <sup>1</sup>	42.5 <sup>2</sup>	4.6
	23:50-23:55 HOUR	43.1 <sup>2</sup>	39.2 <sup>1</sup>	44.1 <sup>2</sup>	6.2
	23:55-00:00 HOUR	43.9 <sup>2</sup>	39.2 <sup>1</sup>	43.9 <sup>2</sup>	6.0
	NIGHT TIME 2/				
	00:00-00:05 HOUR	41.6 <sup>2</sup>	39.2 <sup>1</sup>	40.1 <sup>2</sup>	2.2
	00:05-00:10 HOUR	41.8 <sup>2</sup>	39.2 <sup>1</sup>	41.8 <sup>2</sup>	3.9
	00:10-00:15 HOUR	40.6 <sup>2</sup>	39.2 <sup>1</sup>	39.2 <sup>1</sup>	NOT SIGNIFICANT <sup>2</sup>
	00:15-00:20 HOUR	42.7 <sup>2</sup>	39.2 <sup>1</sup>	43.7 <sup>2</sup>	5.8
	00:20-00:25 HOUR	43.9 <sup>2</sup>	39.2 <sup>1</sup>	39.4 <sup>2</sup>	1.5
	00:25-00:30 HOUR	41.6 <sup>2</sup>	39.2 <sup>1</sup>	40.1 <sup>2</sup>	2.2
	00:30-00:35 HOUR	42.5 <sup>2</sup>	39.2 <sup>1</sup>	42.5 <sup>2</sup>	4.6
	00:35-00:40 HOUR	41.4 <sup>2</sup>	39.2 <sup>1</sup>	39.9 <sup>2</sup>	2.0
	00:40-00:45 HOUR	41.9 <sup>2</sup>	39.2 <sup>1</sup>	41.9 <sup>2</sup>	4.0
	00:45-00:50 HOUR	43.6 <sup>2</sup>	39.2 <sup>1</sup>	43.7 <sup>2</sup>	5.8
	00:50-00:55 HOUR	42.7 <sup>2</sup>	39.2 <sup>1</sup>	42.4 <sup>2</sup>	4.5
	00:55-01:00 HOUR	42.8 <sup>2</sup>	39.2 <sup>1</sup>	43.8 <sup>2</sup>	5.9
	01:00-01:05 HOUR	43.7 <sup>2</sup>	39.2 <sup>1</sup>	45.2 <sup>2</sup>	7.3
	01:05-01:10 HOUR	43.7 <sup>2</sup>	39.2 <sup>1</sup>	45.8 <sup>2</sup>	7.9
	01:10-01:15 HOUR	44.3 <sup>2</sup>	39.2 <sup>1</sup>	45.4 <sup>2</sup>	7.5
	01:15-01:20 HOUR	43.9 <sup>2</sup>	39.2 <sup>1</sup>	44.6 <sup>2</sup>	6.7
	01:20-01:25 HOUR	43.6 <sup>2</sup>	39.2 <sup>1</sup>	44.2 <sup>2</sup>	6.3
	01:25-01:30 HOUR	42.5 <sup>2</sup>	39.2 <sup>1</sup>	42.5 <sup>2</sup>	4.6
	01:30-01:35 HOUR	42.5 <sup>2</sup>	39.2 <sup>1</sup>	42.4 <sup>2</sup>	4.5
	01:35-01:40 HOUR	42.4 <sup>2</sup>	39.2 <sup>1</sup>	41.8 <sup>2</sup>	3.9
	01:40-01:45 HOUR	41.8 <sup>2</sup>	39.2 <sup>1</sup>	35.7 <sup>2</sup>	NOT SIGNIFICANT <sup>2</sup>
	01:45-01:50 HOUR	40.4 <sup>2</sup>	39.2 <sup>1</sup>	36.4 <sup>2</sup>	NOT SIGNIFICANT <sup>2</sup>
	01:50-01:55 HOUR	40.1 <sup>2</sup>	39.2 <sup>1</sup>	36.1 <sup>2</sup>	NOT SIGNIFICANT <sup>2</sup>
	01:55-02:00 HOUR	40.3 <sup>2</sup>	39.2 <sup>1</sup>	36.3 <sup>2</sup>	NOT SIGNIFICANT <sup>2</sup>
	02:00-02:05 HOUR	39.6 <sup>2</sup>	39.2 <sup>1</sup>	35.6 <sup>2</sup>	NOT SIGNIFICANT <sup>2</sup>
	02:05-02:10 HOUR	39.2 <sup>2</sup>	39.2 <sup>1</sup>	35.2 <sup>2</sup>	NOT SIGNIFICANT <sup>2</sup>
	02:10-02:15 HOUR	39.2 <sup>2</sup>	39.2 <sup>1</sup>	35.3 <sup>2</sup>	NOT SIGNIFICANT <sup>2</sup>
	02:15-02:20 HOUR	39.3 <sup>2</sup>	39.2 <sup>1</sup>	35.6 <sup>2</sup>	NOT SIGNIFICANT <sup>2</sup>
	02:20-02:25 HOUR	39.7 <sup>2</sup>	39.2 <sup>1</sup>	35.7 <sup>2</sup>	NOT SIGNIFICANT <sup>2</sup>
	02:25-02:30 HOUR	39.7 <sup>2</sup>	39.2 <sup>1</sup>	35.7 <sup>2</sup>	NOT SIGNIFICANT <sup>2</sup>

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DATE	TIME	RESULT (dB(A))			
		SPECIFIC NOISE LEVEL	RESIDUAL NOISE LEVEL	SPECIFIC NOISE LEVEL (IMPROVE NOISE LEVEL)	ANNOYANCE NOISE LEVEL
JULY 27, 2022 T22A0951-0003	NIGHT TIME 2/				
	02:30-02:35 HOUR	40.5 <sup>2</sup>	39.2 <sup>1</sup>	36.5 <sup>2</sup>	NOT SIGNIFICANT <sup>2</sup>
	02:35-02:40 HOUR	40.9 <sup>2</sup>	39.2 <sup>1</sup>	39.4 <sup>2</sup>	1.5
	02:40-02:45 HOUR	40.8 <sup>2</sup>	39.2 <sup>1</sup>	39.3 <sup>2</sup>	1.4
	02:45-02:50 HOUR	42.1 <sup>2</sup>	39.2 <sup>1</sup>	42.1 <sup>2</sup>	4.2
	02:50-02:55 HOUR	40.2 <sup>2</sup>	39.2 <sup>1</sup>	36.2 <sup>2</sup>	NOT SIGNIFICANT <sup>2</sup>
	02:55-03:00 HOUR	39.7 <sup>2</sup>	39.2 <sup>1</sup>	35.7 <sup>2</sup>	NOT SIGNIFICANT <sup>2</sup>
	03:00-03:05 HOUR	42.7 <sup>2</sup>	39.2 <sup>1</sup>	43.7 <sup>2</sup>	5.8
	03:05-03:10 HOUR	42.9 <sup>2</sup>	39.2 <sup>1</sup>	43.9 <sup>2</sup>	6.0
	03:10-03:15 HOUR	43.5 <sup>2</sup>	39.2 <sup>1</sup>	44.5 <sup>2</sup>	6.6
	03:15-03:20 HOUR	43.4 <sup>2</sup>	39.2 <sup>1</sup>	44.4 <sup>2</sup>	6.5
	03:20-03:25 HOUR	40.6 <sup>2</sup>	39.2 <sup>1</sup>	36.6 <sup>2</sup>	NOT SIGNIFICANT <sup>2</sup>
	03:25-03:30 HOUR	42.3 <sup>2</sup>	39.2 <sup>1</sup>	42.3 <sup>2</sup>	4.4
	03:30-03:35 HOUR	40.8 <sup>2</sup>	39.2 <sup>1</sup>	39.3 <sup>2</sup>	1.4
	03:35-03:40 HOUR	42.2 <sup>2</sup>	39.2 <sup>1</sup>	43.2 <sup>2</sup>	5.8
	03:40-03:45 HOUR	41.5 <sup>2</sup>	39.2 <sup>1</sup>	40.0 <sup>2</sup>	2.1
	03:45-03:50 HOUR	39.4 <sup>2</sup>	39.2 <sup>1</sup>	35.4 <sup>2</sup>	NOT SIGNIFICANT <sup>2</sup>
	03:50-03:55 HOUR	40.7 <sup>2</sup>	39.2 <sup>1</sup>	36.2 <sup>2</sup>	1.3
	03:55-04:00 HOUR	40.2 <sup>2</sup>	39.2 <sup>1</sup>	36.2 <sup>2</sup>	NOT SIGNIFICANT <sup>2</sup>
	04:00-04:05 HOUR	42.0 <sup>2</sup>	39.2 <sup>1</sup>	42.0 <sup>2</sup>	4.1
	04:05-04:10 HOUR	44.5 <sup>2</sup>	39.2 <sup>1</sup>	46.3 <sup>2</sup>	8.4
	04:10-04:15 HOUR	41.4 <sup>2</sup>	39.2 <sup>1</sup>	39.9 <sup>2</sup>	2.0
	04:15-04:20 HOUR	40.9 <sup>2</sup>	39.2 <sup>1</sup>	36.5 <sup>2</sup>	NOT SIGNIFICANT <sup>2</sup>
	04:20-04:25 HOUR	40.3 <sup>2</sup>	39.2 <sup>1</sup>	36.3 <sup>2</sup>	NOT SIGNIFICANT <sup>2</sup>
	04:25-04:30 HOUR	40.1 <sup>2</sup>	39.2 <sup>1</sup>	36.1 <sup>2</sup>	NOT SIGNIFICANT <sup>2</sup>
	04:30-04:35 HOUR	41.8 <sup>2</sup>	39.2 <sup>1</sup>	41.8 <sup>2</sup>	3.9
	04:35-04:40 HOUR	40.8 <sup>2</sup>	39.2 <sup>1</sup>	39.3 <sup>2</sup>	1.4
	04:40-04:45 HOUR	40.9 <sup>2</sup>	39.2 <sup>1</sup>	39.4 <sup>2</sup>	1.5
	04:45-04:50 HOUR	42.9 <sup>2</sup>	39.2 <sup>1</sup>	43.9 <sup>2</sup>	6.0
	04:50-04:55 HOUR	42.2 <sup>2</sup>	39.2 <sup>1</sup>	42.2 <sup>2</sup>	4.3
	04:55-05:00 HOUR	41.8 <sup>2</sup>	39.2 <sup>1</sup>	41.8 <sup>2</sup>	3.9
	05:00-05:05 HOUR	42.5 <sup>2</sup>	39.2 <sup>1</sup>	42.5 <sup>2</sup>	4.6
	05:05-05:10 HOUR	42.3 <sup>2</sup>	39.2 <sup>1</sup>	42.3 <sup>2</sup>	4.4
	05:10-05:15 HOUR	42.0 <sup>2</sup>	39.2 <sup>1</sup>	42.0 <sup>2</sup>	4.1
	05:15-05:20 HOUR	43.2 <sup>2</sup>	39.2 <sup>1</sup>	44.2 <sup>2</sup>	6.3
	05:20-05:25 HOUR	44.7 <sup>2</sup>	39.2 <sup>1</sup>	46.2 <sup>2</sup>	8.3
	05:25-05:30 HOUR	43.8 <sup>2</sup>	39.2 <sup>1</sup>	45.3 <sup>2</sup>	7.4
	05:30-05:35 HOUR	43.2 <sup>2</sup>	39.2 <sup>1</sup>	44.2 <sup>2</sup>	6.3
	05:35-05:40 HOUR	40.9 <sup>2</sup>	39.2 <sup>1</sup>	39.4 <sup>2</sup>	1.5
	05:40-05:45 HOUR	44.1 <sup>2</sup>	39.2 <sup>1</sup>	45.6 <sup>2</sup>	7.7
	05:45-05:50 HOUR	41.5 <sup>2</sup>	39.2 <sup>1</sup>	40.0 <sup>2</sup>	2.1
	05:50-05:55 HOUR	41.3 <sup>2</sup>	39.2 <sup>1</sup>	39.8 <sup>2</sup>	1.9
	05:55-06:00 HOUR	44.4 <sup>2</sup>	39.2 <sup>1</sup>	45.9 <sup>2</sup>	8.0
	DAY TIME 1/				
	06:00-07:00 HOUR	44.1 <sup>2</sup>	42.9 <sup>1</sup>	37.1 <sup>2</sup>	NOT SIGNIFICANT <sup>2</sup>

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REMARK :  
1/ CASE 1 CALCULATION (DURING 06:00 TO 22:00 HOUR) : SPECIFIC NOISE LEVEL CONTINUOUSLY OCCUR AT LEAST 1 HOUR,  
MEASURING AS  $L_{eq,1hr}$   
2/ CASE 4 CALCULATION (DURING 22:00 TO 06:00 HOUR) : SPECIFIC NOISE LEVEL OCCUR IN RESTFUL AREA OR NIGHT TIME,  
MEASURING AS  $L_{eq,5min}$   
3/ NOT SIGNIFICANT MEANS ANNOYING NOISE LEVEL IS LOWER THAN 0.  
4/ PERCENTILE LEVEL 90 ( $L_{90}$ ) IS MIDDLE VALUE OF 3 TIMES MEASURING.  
(15 MINUTES MEASURING DURING 06:00 TO 22:00 HOUR)  
AND RESIDUAL NOISE LEVEL ( $L_{res}$  5 minutes) IS CHOSE AT THE SAME TIME AS PERCENTILE LEVEL 90 ABOVE.  
5/ PERCENTILE LEVEL 90 ( $L_{90}$ ) IS MIDDLE VALUE OF 3 TIMES MEASURING.  
(15 MINUTES MEASURING DURING 22:00 TO 06:00 HOUR)  
AND RESIDUAL NOISE LEVEL ( $L_{res}$  5 minutes) IS CHOSE AT THE SAME TIME AS PERCENTILE LEVEL 90 ABOVE.



**ANALYSIS REPORT**  
CUSTOMER NAME : BANGKOK ELECTRICITY GENERATING COMPANY LIMITED  
ADDRESS : 111 MOO 12 THAP LUANG BAN RAI UTHAI THANI 61140  
CONTACT INFORMATION : TEL : 09 5992 6595 E-mail : Sales@bengco.com  
MEASURING PLACE : 111 BANGKOK  
MEASURING TYPE : AMBIENT (ANNOYANCE NOISE)  
MEASURING DATE : JULY 24-27, 2022  
MEASURING TIME :  
MEASURING EQUIPMENT : INTEGRATED SOUND LEVEL METER AND  
CALCULATION  
MEASURED BY : MR. SOMPAT JONGPHADUNGKIT  
ANALYSIS NO. : T22A0951-0004 - T22A0951-0006  
RECEIVED DATE : JULY 24-27, 2022  
ANALYTICAL DATE : JULY 24-27, 2022  
REPORT NO. : 2022-000001  
WORK NO. : 2022-000024

DATE	TIME*	RESULT (dB(A))			
		SPECIFIC NOISE LEVEL	RESIDUAL NOISE LEVEL	SPECIFIC NOISE LEVEL (IMPROVE)	ANNOYANCE NOISE LEVEL
JULY 24, 2022 T22A0951-0004	07:00-08:00 HOUR	54.2 v	53.0 "	47.2 "	51.2 "
	08:00-09:00 HOUR	53.1 v	53.0 "	46.1 "	51.2 "
	09:00-10:00 HOUR	56.0 v	53.0 "	53.0 "	51.2 "
	10:00-11:00 HOUR	54.3 v	53.0 "	47.3 "	51.2 "
	11:00-12:00 HOUR	58.6 v	53.0 "	57.1 "	51.2 "
	12:00-13:00 HOUR	55.9 v	53.0 "	52.9 "	51.2 "
	13:00-14:00 HOUR	53.4 v	53.0 "	46.4 "	51.2 "
	14:00-15:00 HOUR	54.3 v	53.0 "	47.3 "	51.2 "
	15:00-16:00 HOUR	55.1 v	53.0 "	50.7 "	51.2 "
	16:00-17:00 HOUR	56.9 v	53.0 "	54.9 "	51.2 "
	17:00-18:00 HOUR	55.8 v	53.0 "	52.8 "	51.2 "
	18:00-19:00 HOUR	57.0 v	53.0 "	55.0 "	51.2 "
	19:00-20:00 HOUR	56.4 v	53.0 "	53.4 "	51.2 "
	20:00-21:00 HOUR	55.5 v	53.0 "	52.5 "	51.2 "
	21:00-22:00 HOUR	48.8 v	47.0 "	47.3 "	45.8 "
	22:00-22:05 HOUR	49.8 v	47.0 "	49.8 "	45.8 "
	22:10-22:15 HOUR	46.5 v	47.0 "	47.1 "	45.8 "
	22:15-22:20 HOUR	48.9 v	47.0 "	47.4 "	45.8 "
	22:20-22:25 HOUR	46.6 v	47.0 "	46.6 "	45.8 "
	22:25-22:30 HOUR	49.1 v	47.0 "	47.6 "	45.8 "
JULY 25, 2022 T22A0951-0005	22:30-22:35 HOUR	49.5 v	47.0 "	49.5 "	45.8 "
	22:35-22:40 HOUR	46.0 v	47.0 "	47.5 "	45.8 "
	22:40-22:45 HOUR	48.3 v	47.0 "	49.3 "	45.8 "
	22:45-22:50 HOUR	49.0 v	47.0 "	47.5 "	45.8 "
	22:50-22:55 HOUR	46.2 v	47.0 "	46.2 "	45.8 "
	22:55-23:00 HOUR	48.1 v	47.0 "	49.1 "	45.8 "
	23:00-23:05 HOUR	46.6 v	47.0 "	47.1 "	45.8 "
	23:05-23:10 HOUR	49.0 v	47.0 "	47.5 "	45.8 "
	23:10-23:15 HOUR	46.7 v	47.0 "	47.2 "	45.8 "
	23:15-23:20 HOUR	48.7 v	47.0 "	47.2 "	45.8 "

DATE	TIME*	RESULT (dB(A))			
		1hr data/4hr data			
		SPECIFIC NOISE LEVEL	RESIDUAL NOISE LEVEL	SPECIFIC NOISE LEVEL (IMPROVE NOISE LEVEL)	BACKGROUND NOISE LEVEL
JULY 25, 2022 T22A0951-0004	NIGHT TIME <sup>2/</sup> 03:05-03:10 HOUR 03:10-03:15 HOUR 03:15-03:20 HOUR 03:20-03:25 HOUR 03:25-03:30 HOUR 03:30-03:35 HOUR 03:35-03:40 HOUR 03:40-03:45 HOUR 03:45-03:50 HOUR	48.7 <sup>2/</sup>	47.0 <sup>***</sup>	48.7 <sup>2/</sup>	45.8 <sup>***</sup>
		47.2 <sup>2/</sup>	47.0 <sup>***</sup>	43.2 <sup>***</sup>	45.8 <sup>***</sup>
		47.1 <sup>2/</sup>	47.0 <sup>***</sup>	43.1 <sup>2/</sup>	45.8 <sup>***</sup>
		46.4 <sup>2/</sup>	47.0 <sup>***</sup>	44.4 <sup>2/</sup>	45.8 <sup>***</sup>
		48.6 <sup>2/</sup>	47.0 <sup>***</sup>	49.6 <sup>2/</sup>	45.8 <sup>***</sup>
		48.9 <sup>2/</sup>	47.0 <sup>***</sup>	48.9 <sup>2/</sup>	45.8 <sup>***</sup>
		48.5 <sup>2/</sup>	47.0 <sup>***</sup>	47.0 <sup>2/</sup>	45.8 <sup>***</sup>
		48.2 <sup>2/</sup>	47.0 <sup>***</sup>	44.2 <sup>2/</sup>	45.8 <sup>***</sup>
		49.6 <sup>2/</sup>	47.0 <sup>***</sup>	49.6 <sup>2/</sup>	45.8 <sup>***</sup>
		48.8 <sup>2/</sup>	47.0 <sup>***</sup>	44.0 <sup>2/</sup>	45.8 <sup>***</sup>
	DAY TIME <sup>3/</sup> 04:00-04:05 HOUR 04:05-04:10 HOUR 04:10-04:15 HOUR 04:15-04:20 HOUR 04:20-04:25 HOUR 04:25-04:30 HOUR 04:30-04:35 HOUR 04:35-04:40 HOUR 04:40-04:45 HOUR	46.7 <sup>2/</sup>	47.0 <sup>***</sup>	46.7 <sup>2/</sup>	45.8 <sup>***</sup>
		46.6 <sup>2/</sup>	47.0 <sup>***</sup>	46.6 <sup>2/</sup>	45.8 <sup>***</sup>
		49.2 <sup>2/</sup>	47.0 <sup>***</sup>	47.7 <sup>2/</sup>	45.8 <sup>***</sup>
		48.5 <sup>2/</sup>	47.0 <sup>***</sup>	48.5 <sup>2/</sup>	45.8 <sup>***</sup>
		48.1 <sup>2/</sup>	47.0 <sup>***</sup>	49.1 <sup>2/</sup>	45.8 <sup>***</sup>
		47.3 <sup>2/</sup>	47.0 <sup>***</sup>	48.3 <sup>2/</sup>	45.8 <sup>***</sup>
		47.3 <sup>2/</sup>	47.0 <sup>***</sup>	43.3 <sup>2/</sup>	45.8 <sup>***</sup>
		47.8 <sup>2/</sup>	47.0 <sup>***</sup>	48.8 <sup>2/</sup>	45.8 <sup>***</sup>
		49.4 <sup>2/</sup>	47.0 <sup>***</sup>	47.9 <sup>2/</sup>	45.8 <sup>***</sup>
		47.9 <sup>2/</sup>	47.0 <sup>***</sup>	48.9 <sup>2/</sup>	45.8 <sup>***</sup>
DAY TIME <sup>3/</sup> 04:55-05:00 HOUR 05:00-05:05 HOUR 05:05-05:10 HOUR 05:10-05:15 HOUR 05:15-05:20 HOUR 05:20-05:25 HOUR 05:25-05:30 HOUR 05:30-05:35 HOUR 05:35-05:40 HOUR	47.4 <sup>2/</sup>	47.0 <sup>***</sup>	43.4 <sup>2/</sup>	45.8 <sup>***</sup>	
	47.0 <sup>2/</sup>	47.0 <sup>***</sup>	43.0 <sup>2/</sup>	45.8 <sup>***</sup>	
	47.2 <sup>2/</sup>	47.0 <sup>***</sup>	43.2 <sup>2/</sup>	45.8 <sup>***</sup>	
	48.1 <sup>2/</sup>	47.0 <sup>***</sup>	44.1 <sup>2/</sup>	45.8 <sup>***</sup>	
	48.1 <sup>2/</sup>	47.0 <sup>***</sup>	44.1 <sup>2/</sup>	45.8 <sup>***</sup>	
	48.7 <sup>2/</sup>	47.0 <sup>***</sup>	47.2 <sup>2/</sup>	45.8 <sup>***</sup>	
	48.1 <sup>2/</sup>	47.0 <sup>***</sup>	49.1 <sup>2/</sup>	45.8 <sup>***</sup>	
	47.2 <sup>2/</sup>	47.0 <sup>***</sup>	49.6 <sup>2/</sup>	45.8 <sup>***</sup>	
	48.5 <sup>2/</sup>	47.0 <sup>***</sup>	43.5 <sup>2/</sup>	45.8 <sup>***</sup>	
	47.8 <sup>2/</sup>	47.0 <sup>***</sup>	43.8 <sup>2/</sup>	45.8 <sup>***</sup>	
JULY 25, 2022 T22A0951-0005	05:50-05:55 HOUR	48.5 <sup>2/</sup>	47.0 <sup>***</sup>	47.0 <sup>2/</sup>	45.8 <sup>***</sup>
	05:55-06:00 HOUR	48.8 <sup>2/</sup>	47.0 <sup>***</sup>	47.3 <sup>2/</sup>	45.8 <sup>***</sup>
	DAY TIME <sup>3/</sup> 06:00-07:00 HOUR	55.3 <sup>2/</sup>	55.0 <sup>***</sup>	50.8 <sup>2/</sup>	51.2 <sup>***</sup>
	DAY TIME <sup>3/</sup> 07:00-08:00 HOUR	56.2 <sup>2/</sup>	52.1 <sup>***</sup>	54.2 <sup>2/</sup>	50.7 <sup>***</sup>
T22A0951-0005	08:00-09:00 HOUR	56.6 <sup>2/</sup>	52.1 <sup>***</sup>	58.1 <sup>2/</sup>	50.7 <sup>***</sup>
	09:00-10:00 HOUR	52.1 <sup>2/</sup>	52.1 <sup>***</sup>	49.1 <sup>2/</sup>	50.7 <sup>***</sup>
	10:00-11:00 HOUR	54.2 <sup>2/</sup>	52.1 <sup>***</sup>	46.1 <sup>2/</sup>	50.7 <sup>***</sup>
	11:00-12:00 HOUR	53.3 <sup>2/</sup>	52.1 <sup>***</sup>	46.3 <sup>2/</sup>	50.7 <sup>***</sup>
	12:00-13:00 HOUR	55.0 <sup>2/</sup>	52.1 <sup>***</sup>	52.0 <sup>2/</sup>	50.7 <sup>***</sup>
	13:00-14:00 HOUR	52.8 <sup>2/</sup>	52.1 <sup>***</sup>	45.8 <sup>2/</sup>	50.7 <sup>***</sup>

DATE	TIME	RESULT (dB(A))			
		SPECIFIC NOISE LEVEL	RESIDUAL NOISE LEVEL	SPECIFIC NOISE LEVEL (IMPROVE NOISE LEVEL)	ANNOYANCE NOISE LEVEL
JULY 26, 2022 TZ200951-0005	DAYTIME				
	14:00-15:00 HOUR	54.3 v	52.1 "	49.8 v	50.7 "
	15:00-16:00 HOUR	55.4 v	52.1 "	52.4 v	50.7 "
	16:00-17:00 HOUR	55.0 v	52.1 "	52.0 v	50.7 "
	17:00-18:00 HOUR	51.8 v	52.1 "	51.8 v	50.7 "
	18:00-19:00 HOUR	55.6 v	52.1 "	53.6 v	50.7 "
	19:00-20:00 HOUR	55.0 v	52.1 "	52.0 v	50.7 "
	20:00-21:00 HOUR	55.0 v	52.1 "	52.0 v	50.7 "
	21:00-22:00 HOUR	55.1 v	52.1 "	52.1 v	50.7 "
	NIGHTTIME				
	22:00-23:00 HOUR	46.6 v	44.5 "	49.6 v	42.8 "
	23:00-23:30 HOUR	46.6 v	44.5 "	45.1 v	42.8 "
	23:30-24:00 HOUR	47.9 v	44.5 "	47.9 v	42.8 "
	24:00-01:00 HOUR	44.7 v	44.5 "	44.7 v	42.8 "
	01:00-02:00 HOUR	46.6 v	44.5 "	45.1 v	42.8 "
	02:00-03:00 HOUR	48.9 v	44.5 "	48.9 v	42.8 "
	03:00-04:00 HOUR	47.2 v	44.5 "	47.2 v	42.8 "
	04:00-05:00 HOUR	45.0 v	44.5 "	41.0 v	42.8 "
	05:00-06:00 HOUR	45.3 v	44.5 "	41.3 v	42.8 "
	06:00-07:00 HOUR	46.0 v	44.5 "	44.7 v	42.8 "
	07:00-08:00 HOUR	46.5 v	44.5 "	41.5 v	42.8 "
	08:00-09:00 HOUR	46.7 v	44.5 "	45.2 v	42.8 "
	09:00-10:00 HOUR	46.3 v	44.5 "	44.7 v	42.8 "
	10:00-11:00 HOUR	46.9 v	44.5 "	41.9 v	42.8 "
	11:00-12:00 HOUR	46.5 v	44.5 "	45.0 v	42.8 "
	12:00-13:00 HOUR	46.0 v	44.5 "	44.5 v	42.8 "
	13:00-14:00 HOUR	46.3 v	44.5 "	41.7 v	42.8 "
	14:00-15:00 HOUR	47.1 v	44.5 "	47.1 v	42.8 "
	15:00-16:00 HOUR	46.6 v	44.5 "	45.1 v	42.8 "
	16:00-17:00 HOUR	46.2 v	44.5 "	44.7 v	42.8 "
	17:00-18:00 HOUR	48.5 v	44.5 "	48.5 v	42.8 "
	18:00-19:00 HOUR	47.1 v	44.5 "	47.1 v	42.8 "
	19:00-20:00 HOUR	46.9 v	44.5 "	45.4 v	42.8 "
	20:00-21:00 HOUR	47.4 v	44.5 "	47.4 v	42.8 "
	21:00-22:00 HOUR	46.8 v	44.5 "	49.8 v	42.8 "
	22:00-23:00 HOUR	48.3 v	44.5 "	49.3 v	42.8 "
	23:00-24:00 HOUR	49.0 v	44.5 "	50.3 v	42.8 "
	00:00-01:00 HOUR	49.3 v	44.5 "	50.8 v	42.8 "

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NO NOISE CONTROL  
 NO NOISE CONTROL  
 NO NOISE CONTROL

2022-10-06001

DATE	TIME	RESULT (dB(A))			
		SPECIFIC NOISE LEVEL	RESIDUAL NOISE LEVEL	SPECIFIC NOISE LEVEL (IMPROVE NOISE LEVEL)	ANNOYANCE NOISE LEVEL
JULY 26, 2022 TZ200951-0005	NIGHTTIME				
	00:30-01:00 HOUR	46.0 v	44.5 "	44.5 v	42.8 "
	01:00-01:30 HOUR	45.9 v	44.5 "	41.9 v	42.8 "
	01:30-02:00 HOUR	46.8 v	44.5 "	45.0 v	42.8 "
	02:00-02:30 HOUR	47.5 v	44.5 "	47.5 v	42.8 "
	02:30-03:00 HOUR	46.5 v	44.5 "	45.0 v	42.8 "
	03:00-03:30 HOUR	48.8 v	44.5 "	49.8 v	42.8 "
	03:30-04:00 HOUR	45.6 v	44.5 "	41.6 v	42.8 "
	04:00-04:30 HOUR	45.7 v	44.5 "	41.7 v	42.8 "
	04:30-05:00 HOUR	45.5 v	44.5 "	41.5 v	42.8 "
	05:00-05:30 HOUR	45.3 v	44.5 "	41.3 v	42.8 "
	05:30-06:00 HOUR	45.7 v	44.5 "	41.7 v	42.8 "
	06:00-06:30 HOUR	45.3 v	44.5 "	41.3 v	42.8 "
	06:30-07:00 HOUR	45.7 v	44.5 "	41.7 v	42.8 "
	07:00-07:30 HOUR	45.5 v	44.5 "	41.5 v	42.8 "
	07:30-08:00 HOUR	47.9 v	44.5 "	47.9 v	42.8 "
	08:00-08:30 HOUR	47.4 v	44.5 "	47.4 v	42.8 "
	08:30-09:00 HOUR	45.1 v	44.5 "	41.1 v	42.8 "
	09:00-09:30 HOUR	45.0 v	44.5 "	41.0 v	42.8 "
	09:30-10:00 HOUR	45.6 v	44.5 "	41.6 v	42.8 "
	10:00-10:30 HOUR	45.6 v	44.5 "	41.6 v	42.8 "
	10:30-11:00 HOUR	45.6 v	44.5 "	41.6 v	42.8 "
	11:00-11:30 HOUR	45.6 v	44.5 "	41.6 v	42.8 "
	11:30-12:00 HOUR	45.6 v	44.5 "	41.6 v	42.8 "
	12:00-12:30 HOUR	45.6 v	44.5 "	41.6 v	42.8 "
	12:30-13:00 HOUR	45.6 v	44.5 "	41.6 v	42.8 "
	13:00-13:30 HOUR	45.6 v	44.5 "	41.6 v	42.8 "
	13:30-14:00 HOUR	45.6 v	44.5 "	41.6 v	42.8 "
	14:00-14:30 HOUR	45.6 v	44.5 "	41.6 v	42.8 "
	14:30-15:00 HOUR	45.6 v	44.5 "	41.6 v	42.8 "
	15:00-15:30 HOUR	45.6 v	44.5 "	41.6 v	42.8 "
	15:30-16:00 HOUR	45.6 v	44.5 "	41.6 v	42.8 "
	16:00-16:30 HOUR	45.6 v	44.5 "	41.6 v	42.8 "
	16:30-17:00 HOUR	45.6 v	44.5 "	41.6 v	42.8 "
	17:00-17:30 HOUR	45.6 v	44.5 "	41.6 v	42.8 "
	17:30-18:00 HOUR	45.6 v	44.5 "	41.6 v	42.8 "
	18:00-18:30 HOUR	45.6 v	44.5 "	41.6 v	42.8 "
	18:30-19:00 HOUR	45.6 v	44.5 "	41.6 v	42.8 "
	19:00-19:30 HOUR	45.6 v	44.5 "	41.6 v	42.8 "
	19:30-20:00 HOUR	45.6 v	44.5 "	41.6 v	42.8 "
	20:00-20:30 HOUR	45.6 v	44.5 "	41.6 v	42.8 "
	20:30-21:00 HOUR	45.6 v	44.5 "	41.6 v	42.8 "
	21:00-21:30 HOUR	45.6 v	44.5 "	41.6 v	42.8 "
	21:30-22:00 HOUR	45.6 v	44.5 "	41.6 v	42.8 "
	22:00-22:30 HOUR	45.6 v	44.5 "	41.6 v	42.8 "
	22:30-23:00 HOUR	45.6 v	44.5 "	41.6 v	42.8 "
	23:00-23:30 HOUR	45.6 v	44.5 "	41.6 v	42.8 "
	23:30-24:00 HOUR	45.6 v	44.5 "	41.6 v	42.8 "

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2022-10-06001



MR. TUL TIRI  
TESTING 6287

**LAE** United Analyst and Engineering Consultant Co., Ltd.  
3 Soi Udomsuk 41, Sukhumvit Road, Bangkok, Phrakhanong, Bangkok 10260  
Tel. 0 2763 2828 Fax 0 2763 2800 www.laeconsultant.com E-mail: lae@laeconsultant.com

DATE	TIME	RESULT (dB(A)) ผลการวัด			
		SPECIFIC NOISE LEVEL	RESIDUAL NOISE LEVEL	SPECIFIC NOISE LEVEL (IMPROVE NOISE LEVEL)	BACKGROUND NOISE LEVEL
JULY 26, 2022 T22A0951-0005	NIGHT TIME 2/				
	04:00-04:45 HOUR	46.1	44.5	44.6	42.8
	04:45-04:50 HOUR	46.6	44.5	45.1	42.8
	04:50-04:55 HOUR	45.7	44.5	41.7	42.8
	04:55-05:00 HOUR	48.3	44.5	41.2	42.8
	05:00-05:05 HOUR	45.5	44.5	41.5	42.8
	05:05-05:10 HOUR	44.5	44.5	41.6	42.8
	05:10-05:15 HOUR	45.8	44.5	41.8	42.8
	05:15-05:20 HOUR	44.6	44.5	40.6	42.8
	05:20-05:25 HOUR	48.8	44.5	49.8	42.8
	05:25-05:30 HOUR	44.5	44.5	40.6	42.8
	05:30-05:35 HOUR	45.2	44.5	41.2	42.8
	05:35-05:40 HOUR	46.3	44.5	49.6	42.8
	05:40-05:45 HOUR	47.3	44.5	47.3	42.8
	05:45-05:50 HOUR	47.8	44.5	47.8	42.8
	05:50-05:55 HOUR	46.8	44.5	46.8	42.8
	05:55-06:00 HOUR	47.4	44.5	47.4	42.8
	DAY TIME 1/				
	06:00-07:00 HOUR	52.2	52.1	45.2	50.7
	DAY TIME 2/				
	07:00-08:00 HOUR	55.9	52.8	52.9	50.9
	08:00-09:00 HOUR	52.9	52.8	50.9	50.9
	09:00-10:00 HOUR	54.8	52.8	50.9	50.9
	10:00-11:00 HOUR	54.2	52.8	47.2	50.9
	11:00-12:00 HOUR	54.5	52.8	50.0	50.9
	12:00-13:00 HOUR	54.8	52.8	50.3	50.9
	13:00-14:00 HOUR	56.8	52.8	54.8	50.9
	14:00-15:00 HOUR	57.1	52.8	55.1	50.9
	15:00-16:00 HOUR	54.9	52.8	50.4	50.9
	16:00-17:00 HOUR	58.6	52.8	57.1	50.9
	17:00-18:00 HOUR	57.0	52.8	55.0	50.9
	18:00-19:00 HOUR	57.8	52.8	56.4	50.9
	19:00-20:00 HOUR	56.6	52.8	54.6	50.9
	20:00-21:00 HOUR	54.6	52.8	50.1	50.9
	21:00-22:00 HOUR	53.7	52.8	46.7	50.9
	NIGHT TIME 2/				
	22:00-22:05 HOUR	45.5	44.5	41.5	42.6
	22:05-22:10 HOUR	45.4	44.5	41.4	42.6
	22:10-22:15 HOUR	45.8	44.5	41.8	42.6
	22:15-22:20 HOUR	46.2	44.5	44.7	42.6
	22:20-22:25 HOUR	46.3	44.5	41.3	42.6
	22:25-22:30 HOUR	44.9	44.5	40.9	42.6
	22:30-22:35 HOUR	45.4	44.5	41.4	42.6
	22:35-22:40 HOUR	45.2	44.5	41.2	42.6
	22:40-22:45 HOUR	48.6	44.5	49.6	42.6
	22:45-22:50 HOUR	48.6	44.5	49.6	42.6

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NO NOISE CAPTURED  
NO NOISE CAPTURED  
BY NOISE CAPTURED

6/9

2022-8060801



MR. TUL TIRI  
TESTING 6287

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DATE	TIME	RESULT (dB(A)) ผลการวัด			
		SPECIFIC NOISE LEVEL	RESIDUAL NOISE LEVEL	SPECIFIC NOISE LEVEL (IMPROVE NOISE LEVEL)	BACKGROUND NOISE LEVEL
JULY 26, 2022 T22A0951-0006	NIGHT TIME 2/				
	22:50-22:55 HOUR	46.0	44.5	44.5	42.6
	22:55-23:00 HOUR	47.3	44.5	47.3	42.6
	23:00-23:05 HOUR	45.9	44.5	41.9	42.6
	23:05-23:10 HOUR	45.9	44.5	45.4	42.6
	23:10-23:15 HOUR	45.9	44.5	41.9	42.6
	23:15-23:20 HOUR	47.9	44.5	47.9	42.6
	23:20-23:25 HOUR	47.9	44.5	47.9	42.6
	23:25-23:30 HOUR	47.7	44.5	47.7	42.6
	23:30-23:35 HOUR	46.8	44.5	45.1	42.6
	23:35-23:40 HOUR	46.7	44.5	45.2	42.6
	23:40-23:45 HOUR	46.5	44.5	45.0	42.6
	23:45-23:50 HOUR	47.2	44.5	47.2	42.6
	23:50-23:55 HOUR	46.4	44.5	46.4	42.6
	23:55-00:00 HOUR	44.7	44.5	40.7	42.6
	NIGHT TIME 1/				
	00:00-00:05 HOUR	46.5	44.5	45.0	42.6
	00:05-00:10 HOUR	45.5	44.5	41.5	42.6
	00:10-00:15 HOUR	45.5	44.5	41.1	42.6
	00:15-00:20 HOUR	45.1	44.5	41.4	42.6
	00:20-00:25 HOUR	45.4	44.5	41.4	42.6
	00:25-00:30 HOUR	45.3	44.5	41.5	42.6
	00:30-00:35 HOUR	44.9	44.5	40.9	42.6
	00:35-00:40 HOUR	45.1	44.5	41.1	42.6
	00:40-00:45 HOUR	44.8	44.5	40.8	42.6
	00:45-00:50 HOUR	44.9	44.5	40.9	42.6
	00:50-00:55 HOUR	45.2	44.5	41.2	42.6
	00:55-01:00 HOUR	47.8	44.5	47.8	42.6
	01:00-01:05 HOUR	44.8	44.5	40.8	42.6
	01:05-01:10 HOUR	45.9	44.5	41.9	42.6
	01:10-01:15 HOUR	45.2	44.5	41.2	42.6
	01:15-01:20 HOUR	45.2	44.5	41.2	42.6
	01:20-01:25 HOUR	44.9	44.5	40.9	42.6
	01:25-01:30 HOUR	46.3	44.5	41.3	42.6
	01:30-01:35 HOUR	47.4	44.5	47.4	42.6
	01:35-01:40 HOUR	46.6	44.5	45.1	42.6
	01:40-01:45 HOUR	45.9	44.5	41.9	42.6
	01:45-01:50 HOUR	45.5	44.5	41.5	42.6
	01:50-01:55 HOUR	45.5	44.5	41.5	42.6
	01:55-02:00 HOUR	45.4	44.5	41.4	42.6
	02:00-02:05 HOUR	46.4	44.5	44.9	42.6
	02:05-02:10 HOUR	45.5	44.5	41.5	42.6
	02:10-02:15 HOUR	45.8	44.5	41.8	42.6
	02:15-02:20 HOUR	45.1	44.5	41.1	42.6
	02:20-02:25 HOUR	46.5	44.5	45.0	42.6
	02:25-02:30 HOUR	46.1	44.5	44.6	42.6

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NO NOISE CAPTURED  
BY NOISE CAPTURED

7/9

2022-4060801

DATE	TIME	RESULT (dB(A)) ผลลัพธ์ (เดบีเอ)			
		SPECIFIC NOISE LEVEL	RESIDUAL NOISE LEVEL	SPECIFIC (IMPROVE) NOISE LEVEL	BACKGROUND NOISE LEVEL
JULY 27, 2022 T22A0651-0006	NIGHT TIME 2/				
	02:30-02:35 HOUR	46.9 2/	44.5 2/	45.4 2/	42.6 2/
	02:35-02:40 HOUR	46.1 2/	44.5 2/	41.1 2/	42.6 2/
	02:40-02:45 HOUR	46.2 2/	44.5 2/	44.7 2/	42.6 2/
	02:45-02:50 HOUR	45.2 2/	44.5 2/	41.2 2/	42.6 2/
	02:50-02:55 HOUR	45.0 2/	44.5 2/	41.0 2/	42.6 2/
	02:55-03:00 HOUR	45.4 2/	44.5 2/	41.4 2/	42.6 2/
	03:00-03:05 HOUR	45.3 2/	44.5 2/	41.5 2/	42.6 2/
	03:05-03:10 HOUR	44.5 2/	44.5 2/	40.5 2/	42.6 2/
	03:10-03:15 HOUR	45.1 2/	44.5 2/	41.1 2/	42.6 2/
	03:15-03:20 HOUR	44.3 2/	44.5 2/	40.8 2/	42.6 2/
	03:20-03:25 HOUR	45.2 2/	44.5 2/	41.7 2/	42.6 2/
	03:25-03:30 HOUR	48.5 2/	44.5 2/	46.5 2/	42.6 2/
	03:30-03:35 HOUR	47.4 2/	44.5 2/	47.4 2/	42.6 2/
	03:35-03:40 HOUR	46.5 2/	44.5 2/	45.0 2/	42.6 2/
	03:40-03:45 HOUR	45.5 2/	44.5 2/	41.5 2/	42.6 2/
	03:45-03:50 HOUR	46.1 2/	44.5 2/	44.6 2/	42.6 2/
	03:50-03:55 HOUR	46.8 2/	44.5 2/	45.3 2/	42.6 2/
	03:55-04:00 HOUR	44.7 2/	44.5 2/	40.7 2/	42.6 2/
	04:00-04:05 HOUR	48.3 2/	44.5 2/	46.5 2/	42.6 2/
	04:05-04:10 HOUR	48.3 2/	44.5 2/	48.3 2/	42.6 2/
	04:10-04:15 HOUR	46.3 2/	44.5 2/	44.8 2/	42.6 2/
	04:15-04:20 HOUR	46.3 2/	44.5 2/	45.0 2/	42.6 2/
	04:20-04:25 HOUR	46.3 2/	44.5 2/	45.0 2/	42.6 2/
	04:25-04:30 HOUR	46.7 2/	44.5 2/	45.2 2/	42.6 2/
	04:30-04:35 HOUR	45.5 2/	44.5 2/	41.5 2/	42.6 2/
	04:35-04:40 HOUR	44.7 2/	44.5 2/	40.7 2/	42.6 2/
	04:40-04:45 HOUR	47.3 2/	44.5 2/	47.3 2/	42.6 2/
	04:45-04:50 HOUR	45.9 2/	44.5 2/	41.9 2/	42.6 2/
	04:50-04:55 HOUR	45.3 2/	44.5 2/	41.3 2/	42.6 2/
	04:55-05:00 HOUR	48.4 2/	44.5 2/	46.4 2/	42.6 2/
	05:00-05:05 HOUR	46.8 2/	44.5 2/	45.3 2/	42.6 2/
	05:05-05:10 HOUR	45.7 2/	44.5 2/	41.7 2/	42.6 2/
	05:10-05:15 HOUR	46.4 2/	44.5 2/	44.9 2/	42.6 2/
	05:15-05:20 HOUR	47.3 2/	44.5 2/	47.3 2/	42.6 2/
	05:20-05:25 HOUR	47.2 2/	44.5 2/	47.2 2/	42.6 2/
	05:25-05:30 HOUR	48.5 2/	44.5 2/	49.5 2/	42.6 2/
	05:30-05:35 HOUR	48.6 2/	44.5 2/	49.6 2/	42.6 2/
	05:35-05:40 HOUR	48.6 2/	44.5 2/	49.6 2/	42.6 2/
	05:40-05:45 HOUR	47.5 2/	44.5 2/	47.5 2/	42.6 2/
	05:45-05:50 HOUR	46.4 2/	44.5 2/	44.9 2/	42.6 2/
	05:50-05:55 HOUR	47.4 2/	44.5 2/	47.4 2/	42.6 2/
	05:55-06:00 HOUR	47.2 2/	44.5 2/	47.2 2/	42.6 2/
	DAY TIME 2/				
	06:00-07:00 HOUR	54.8 2/	52.8 2/	50.3 2/	50.8 2/

# **ANALYSIS REPORT**

**CUSTOMER NAME** : BARRAJ ELECTRICITY GENERATING COMPANY LIMITED  
**ADDRESS** : 111 MOO 12 THAP LUANG BAN RAI LUTHAI THANI 61140  
**CONTACT INFORMATION** : UTAIRAN  
**MEASURING SOURCE** : AMBIENT (NOTISE)  
**MEASURING DATE** : JULY 24-27, 2022  
**MEASURING TIME** : 2022-000002  
**MEASURING METHOD** : INTEGRATED SOUND LEVEL METER  
**MEASURED BY** : T22A0951-0001 - T22A0951-0003

TIME*	RESULT dB(A)		
	Leq 1 hour	Leq 2 hour	Leq 3 hour
07:00-08:00 HOUR	44.2	42.9	40.0
08:00-09:00 HOUR	42.6	42.6	39.6
09:00-10:00 HOUR	43.5	41.5	40.3
10:00-11:00 HOUR	44.6	40.5	39.4
11:00-12:00 HOUR	42.5	44.5	38.8
12:00-13:00 HOUR	44.5	42.7	38.5
13:00-14:00 HOUR	47.5	47.5	43.6
14:00-15:00 HOUR	47.6	46.5	44.3
15:00-16:00 HOUR	47.5	47.5	44.7
16:00-17:00 HOUR	45.6	64.9	43.4
17:00-18:00 HOUR	44.4	61.9	42.3
18:00-19:00 HOUR	47.1	56.7	46.7
19:00-20:00 HOUR	48.9	55.9	45.9
20:00-21:00 HOUR	47.2	78.7	45.9
21:00-22:00 HOUR	44.6	68.8	39.7
22:00-23:00 HOUR	44.0	63.8	40.8
23:00-00:00 HOUR	45.4	59.4	42.7
00:00-01:00 HOUR	44.5	52.8	43.1
01:00-02:00 HOUR	44.0	50.9	42.6
02:00-03:00 HOUR	43.9	67.0	41.2
03:00-04:00 HOUR	44.7	64.5	41.8
04:00-05:00 HOUR	45.1	62.4	42.6
05:00-06:00 HOUR	44.0	61.8	42.3
Leq 24 hours	45.2		

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# **ANALYSIS REPORT**

**CUSTOMER NAME** : BARRAJ ELECTRICITY GENERATING COMPANY LIMITED  
**ADDRESS** : 111 MOO 12 THAP LUANG BAN RAI LUTHAI THANI 61140  
**CONTACT INFORMATION** : UTAIRAN  
**MEASURING SOURCE** : AMBIENT (NOTISE)  
**MEASURING DATE** : JULY 24-27, 2022  
**MEASURING TIME** : 2022-000002  
**MEASURING METHOD** : INTEGRATED SOUND LEVEL METER  
**MEASURED BY** : T22A0951-0001 - T22A0951-0003

TIME*	RESULT dB(A)		
	Leq 1 hour	Leq 2 hour	Leq 3 hour
07:00-08:00 HOUR	45.1	46.0	40.6
08:00-09:00 HOUR	49.1	65.5	44.0
09:00-10:00 HOUR	46.5	63.7	38.9
10:00-11:00 HOUR	49.4	62.3	37.4
11:00-12:00 HOUR	44.7	68.6	40.2
12:00-13:00 HOUR	46.3	74.3	40.7
13:00-14:00 HOUR	46.9	61.8	41.1
14:00-15:00 HOUR	45.0	67.4	38.5
15:00-16:00 HOUR	45.1	62.2	42.0
16:00-17:00 HOUR	46.1	75.5	39.6
17:00-18:00 HOUR	43.7	67.8	39.5
18:00-19:00 HOUR	43.6	64.9	39.4
19:00-20:00 HOUR	44.9	64.1	43.8
20:00-21:00 HOUR	47.4	63.0	43.6
21:00-22:00 HOUR	45.3	54.7	44.5
22:00-23:00 HOUR	46.9	54.3	46.0
23:00-00:00 HOUR	46.5	53.6	44.1
00:00-01:00 HOUR	48.4	54.9	45.4
01:00-02:00 HOUR	44.4	49.9	43.4
02:00-03:00 HOUR	42.9	54.6	41.8
03:00-04:00 HOUR	45.3	51.7	43.1
04:00-05:00 HOUR	47.5	57.1	45.3
05:00-06:00 HOUR	43.7	59.8	41.2
06:00-07:00 HOUR	45.0	64.0	42.6
Leq 24 hours	45.0		

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\* REPORTED ANALYSIS REFERS TO SUBMITTED SAMPLE ONLY.



TIME*	RESULT dB(A)	
	Leq 1 hour	Leq 3 hour
07:00-08:00 HOUR	44.6	41.1
08:00-09:00 HOUR	45.0	39.4
09:00-10:00 HOUR	43.4	38.3
10:00-11:00 HOUR	43.7	38.5
11:00-12:00 HOUR	43.4	38.6
12:00-13:00 HOUR	44.2	40.1
13:00-14:00 HOUR	42.9	35.6
14:00-15:00 HOUR	45.4	33.4
15:00-16:00 HOUR	43.6	35.5
16:00-17:00 HOUR	45.2	32.0
17:00-18:00 HOUR	45.3	35.4
18:00-19:00 HOUR	42.9	36.8
19:00-20:00 HOUR	43.5	40.7
20:00-21:00 HOUR	44.4	42.9
21:00-22:00 HOUR	44.1	42.8
22:00-23:00 HOUR	44.4	43.7
23:00-00:00 HOUR	43.4	42.3
00:00-01:00 HOUR	42.1	35.9
01:00-02:00 HOUR	42.6	41.7
02:00-03:00 HOUR	40.2	36.0
03:00-04:00 HOUR	41.9	36.8
04:00-05:00 HOUR	41.8	39.7
05:00-06:00 HOUR	43.0	39.3
06:00-07:00 HOUR	44.1	35.8
Leq 24 hours		43.7



## ANALYSIS REPORT

**CUSTOMER NAME** : BANGKOK ELECTRICITY GENERATING COMPANY LIMITED  
**ADDRESS** : 111 MUO 12 THAP LUANG BAN RAI UTHAI THANI 61140  
**CONTACT INFORMATION** : TEL : 09 5862 0955 e-mail : safety@bengco.com  
**MEASURING SOURCE** : Traffic in the road  
**MEASURING TYPE** : AMBIENT (NOISE)  
**MEASURING DATE** : JULY 24-27, 2022  
**MEASURING TIME** : \*  
**MEASURING METHOD** : INTEGRATED SOUND LEVEL METER  
**MEASURED BY** : [REDACTED]

**RECEIVED DATE** : JULY 24-27, 2022  
**ANALYTICAL DATE** : JULY 24-27, 2022  
**REPORT NO.** : 2022-006084  
**WORK NO.** : 2022-000024  
**ANALYSIS NO.** : T22A0951-0004 - T22A0951-0006

TIME*	RESULT dB(A)	
	Leq 1 hour	Leq 3 hour
07:00-08:00 HOUR	54.2	42.5
08:00-09:00 HOUR	53.1	41.2
09:00-10:00 HOUR	56.0	41.0
10:00-11:00 HOUR	54.3	41.2
11:00-12:00 HOUR	56.6	40.2
12:00-13:00 HOUR	55.9	40.9
13:00-14:00 HOUR	53.4	41.5
14:00-15:00 HOUR	54.3	41.6
15:00-16:00 HOUR	54.4	47.3
16:00-17:00 HOUR	55.2	44.7
17:00-18:00 HOUR	56.9	44.3
18:00-19:00 HOUR	55.8	43.8
19:00-20:00 HOUR	57.0	51.8
20:00-21:00 HOUR	56.4	52.6
21:00-22:00 HOUR	55.5	51.9
22:00-23:00 HOUR	48.9	46.9
23:00-00:00 HOUR	48.6	47.0
00:00-01:00 HOUR	48.1	46.1
01:00-02:00 HOUR	48.5	47.0
02:00-03:00 HOUR	46.7	46.2
03:00-04:00 HOUR	46.7	46.8
04:00-05:00 HOUR	46.5	41.9
05:00-06:00 HOUR	46.2	43.2
06:00-07:00 HOUR	51.3	46.7
Leq 24 hours		54.3



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REG-7101-710 17101  
TESTING 0207

TIME	RESULT (in A)		
	Leakage 1 hour	Leakage 2 hour	Leakage 3 hour
07:00-08:00 HOUR	56.2	72.6	46.4
08:00-09:00 HOUR	58.6	80.2	43.1
09:00-10:00 HOUR	52.1	68.7	45.4
10:00-11:00 HOUR	54.2	75.7	47.8
11:00-12:00 HOUR	53.3	75.1	47.2
12:00-13:00 HOUR	55.0	75.2	44.5
13:00-14:00 HOUR	52.8	77.4	45.9
14:00-15:00 HOUR	54.3	81.4	46.7
15:00-16:00 HOUR	55.4	76.9	42.6
16:00-17:00 HOUR	55.0	80.8	45.1
17:00-18:00 HOUR	54.8	81.2	42.9
18:00-19:00 HOUR	55.6	77.9	43.8
19:00-20:00 HOUR	55.0	80.6	46.2
20:00-21:00 HOUR	55.0	75.3	43.5
21:00-22:00 HOUR	55.1	75.9	43.5
22:00-23:00 HOUR	46.7	46.3	44.3
23:00-00:00 HOUR	46.1	62.4	44.8
00:00-01:00 HOUR	47.7	68.9	45.6
01:00-02:00 HOUR	46.5	60.6	45.1
02:00-03:00 HOUR	46.9	62.1	44.5
03:00-04:00 HOUR	46.1	65.6	44.4
04:00-05:00 HOUR	46.0	59.1	44.5
05:00-06:00 HOUR	46.9	62.0	40.3
06:00-07:00 HOUR	52.2	70.3	45.0
Leakage 24 hours		53.3	

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2022-0000004

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REG-7101-710 17101  
TESTING 0207

TIME	RESULT (in A)		
	Leakage 1 hour	Leakage 2 hour	Leakage 3 hour
07:00-08:00 HOUR	55.9	71.0	48.9
08:00-09:00 HOUR	52.9	71.2	43.2
09:00-10:00 HOUR	54.5	81.0	47.4
10:00-11:00 HOUR	54.2	75.7	46.7
11:00-12:00 HOUR	54.5	76.6	45.9
12:00-13:00 HOUR	54.8	77.1	47.0
13:00-14:00 HOUR	56.8	79.0	46.1
14:00-15:00 HOUR	57.1	79.9	48.2
15:00-16:00 HOUR	54.9	72.8	44.3
16:00-17:00 HOUR	58.6	83.8	43.8
17:00-18:00 HOUR	57.0	96.8	43.5
18:00-19:00 HOUR	57.9	90.8	44.7
19:00-20:00 HOUR	56.6	81.1	44.0
20:00-21:00 HOUR	54.6	80.6	43.8
21:00-22:00 HOUR	53.7	82.0	44.4
22:00-23:00 HOUR	46.4	58.9	45.0
23:00-00:00 HOUR	48.8	59.5	44.0
00:00-01:00 HOUR	45.6	67.4	43.9
01:00-02:00 HOUR	43.7	61.4	43.7
02:00-03:00 HOUR	45.8	62.8	42.7
03:00-04:00 HOUR	46.1	70.2	45.0
04:00-05:00 HOUR	46.8	65.0	42.5
05:00-06:00 HOUR	47.4	63.7	41.9
06:00-07:00 HOUR	54.8	73.5	
Leakage 24 hours		54.3	

AUGUST 5, 2022

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2022-0000004

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### ANALYSIS REPORT

**CUSTOMER NAME** : BANRAI ELECTRICITY GENERATING COMPANY LIMITED  
**ADDRESS** : 111 MOO 12 THAP LUANG BAN RAI UTHAI THANI 61140  
**CONTACT INFORMATION** : TEL : 09 5992 6395 e-mail : Safety@uaeconsultant.com  
**MEASURING PLACE** : 111 MOO 12 THAP LUANG BAN RAI UTHAI THANI 61140  
**MEASURING TYPE** : AMBIENT (AIR)  
**MEASURING DATE** : JULY 24-27, 2022  
**MEASURING TIME** : JULY 24-27, 2022  
**MEASURING METHOD** : CHEMILUMINESCENCE  
**MEASURED BY** : [REDACTED]

**RECEIVED DATE** : JULY 24-27, 2022  
**ANALYTICAL DATE** : JULY 24-27, 2022  
**REPORT NO.** : 2022-060807  
**WORK NO.** : 2022-000024  
**ANALYSIS NO.** : T22A0952-0001 - T22A0952-0003

TIME *	RESULT (ppm)		
	NITROGEN DIOXIDE		
07:00-08:00 HOUR	JULY 24-25, 2022 T22A0952-0001	JULY 25-26, 2022 T22A0952-0002	JULY 26-27, 2022 T22A0952-0003
	0.0268	0.0274	0.0277
08:00-09:00 HOUR	0.0282	0.0289	0.0291
09:00-10:00 HOUR	0.0284	0.0286	0.0302
10:00-11:00 HOUR	0.0283	0.0274	0.0282
11:00-12:00 HOUR	0.0289	0.0294	0.0285
12:00-13:00 HOUR	0.0275	0.0278	0.0279
13:00-14:00 HOUR	0.0294	0.0284	0.0272
14:00-15:00 HOUR	0.0270	0.0275	0.0286
15:00-16:00 HOUR	0.0301	0.0274	0.0283
16:00-17:00 HOUR	0.0280	0.0281	0.0287
17:00-18:00 HOUR	0.0284	0.0293	0.0284
18:00-19:00 HOUR	0.0285	0.0277	0.0281
19:00-20:00 HOUR	0.0276	0.0267	0.0270
20:00-21:00 HOUR	0.0269	0.0230	0.0262
21:00-22:00 HOUR	0.0250	0.0224	0.0257
22:00-23:00 HOUR	0.0263	0.0256	0.0228
23:00-00:00 HOUR	0.0229	0.0252	0.0235
00:00-01:00 HOUR	0.0235	0.0237	0.0247
01:00-02:00 HOUR	0.0256	0.0294	0.0237
02:00-03:00 HOUR	0.0224	0.0263	0.0268
03:00-04:00 HOUR	0.0260	0.0267	0.0245
04:00-05:00 HOUR	0.0254	0.0253	0.0243
05:00-06:00 HOUR	0.0255	0.0268	0.0260
06:00-07:00 HOUR	0.0263	0.0271	0.0262

AUGUST 5, 2022

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### ANALYSIS REPORT

**CUSTOMER NAME** : BANRAI ELECTRICITY GENERATING COMPANY LIMITED  
**ADDRESS** : 111 MOO 12 THAP LUANG BAN RAI UTHAI THANI 61140  
**CONTACT INFORMATION** : TEL : 09 5992 6395 e-mail : Safety@uaeconsultant.com  
**MEASURING PLACE** : 111 MOO 12 THAP LUANG BAN RAI UTHAI THANI 61140  
**MEASURING TYPE** : AMBIENT (AIR)  
**MEASURING DATE** : JULY 24-27, 2022  
**MEASURING TIME** : JULY 24-27, 2022  
**MEASURING METHOD** : CHEMILUMINESCENCE  
**MEASURED BY** : [REDACTED]

**RECEIVED DATE** : JULY 24-27, 2022  
**ANALYTICAL DATE** : JULY 24-27, 2022  
**REPORT NO.** : 2022-060808  
**WORK NO.** : 2022-000024  
**ANALYSIS NO.** : T22A0952-0004 - T22A0952-0006

TIME *	RESULT (ppm)		
	NITROGEN DIOXIDE		
07:00-08:00 HOUR	JULY 24-25, 2022 T22A0952-0004	JULY 25-26, 2022 T22A0952-0005	JULY 26-27, 2022 T22A0952-0006
	0.0257	0.0261	0.0276
08:00-09:00 HOUR	0.0269	0.0267	0.0275
09:00-10:00 HOUR	0.0275	0.0253	0.0239
10:00-11:00 HOUR	0.0260	0.0263	0.0216
11:00-12:00 HOUR	0.0282	0.0271	0.0269
12:00-13:00 HOUR	0.0256	0.0268	0.0277
13:00-14:00 HOUR	0.0273	0.0278	0.0274
14:00-15:00 HOUR	0.0255	0.0268	0.0268
15:00-16:00 HOUR	0.0269	0.0262	0.0259
16:00-17:00 HOUR	0.0282	0.0286	0.0254
17:00-18:00 HOUR	0.0257	0.0274	0.0274
18:00-19:00 HOUR	0.0273	0.0272	0.0266
19:00-20:00 HOUR	0.0278	0.0284	0.0258
20:00-21:00 HOUR	0.0242	0.0280	0.0233
21:00-22:00 HOUR	0.0246	0.0259	0.0238
22:00-23:00 HOUR	0.0250	0.0259	0.0223
23:00-00:00 HOUR	0.0234	0.0240	0.0264
00:00-01:00 HOUR	0.0243	0.0241	0.0239
01:00-02:00 HOUR	0.0252	0.0247	0.0229
02:00-03:00 HOUR	0.0225	0.0236	0.0239
03:00-04:00 HOUR	0.0257	0.0249	0.0251
04:00-05:00 HOUR	0.0256	0.0232	0.0247
05:00-06:00 HOUR	0.0246	0.0252	0.0249
06:00-07:00 HOUR	0.0248	0.0263	0.0255

AUGUST 5, 2022

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## ANALYSIS REPORT

**CUSTOMER NAME** : BARRAJ ELECTRICITY GENERATING COMPANY LIMITED  
**ADDRESS** : 111 MOO 12 THAP LUANG BAN BAI LUTHA THANG 61140  
**CONTACT INFORMATION** : TEL : 09 5992 6395 e-mail : Safety@uaec.com  
**MEASURING PLACE** : 57m (height)  
**MEASURING TYPE** : AMBIENT (AIR)  
**MEASURING DATE** : JULY 24-27, 2022  
**MEASURING TIME** : JULY 24-27, 2022  
**MEASURING METHOD** : " "  
**MEASURED BY** : WIND SPEED & WIND DIRECTION EQUIPMENT  
**ANALYSIS NO.** : T22A0952-0001 - T22A0952-0003  
**RECEIVED DATE** : JULY 24-27, 2022  
**ANALYTICAL DATE** : JULY 24-27, 2022  
**REPORT NO.** : 2022-0050812  
**WORK NO.** : 2022-000024

TIME *	RESULT (m/s)			
	JULY 24-26, 2022		JULY 25-26, 2022	
	T22A0952-0001	T22A0952-0002	T22A0952-0002	T22A0952-0003
	WIND SPEED	WIND DIRECTION	WIND SPEED	WIND DIRECTION
07:00-08:00 HOUR	0.3	ESE	ENE	ENE
08:00-09:00 HOUR	1.6	ESE	ENE	ENE
09:00-10:00 HOUR	1.6	SSE	ENE	ENE
10:00-11:00 HOUR	2.6	SE	ENE	ENE
11:00-12:00 HOUR	2.3	ESE	E	ENE
12:00-13:00 HOUR	0.3	SE	ENE	ENE
13:00-14:00 HOUR	0.7	ESE	E	ENE
14:00-15:00 HOUR	0.7	SE	E	ENE
15:00-16:00 HOUR	3.2	SSE	ENE	ENE
16:00-17:00 HOUR	0.7	ENE	ENE	ENE
17:00-18:00 HOUR	2.4	ESE	ENE	ENE
18:00-19:00 HOUR	2.5	SE	ENE	ENE
19:00-20:00 HOUR	1.4	SE	ENE	ENE
20:00-21:00 HOUR	3.2	SSE	ENE	ENE
21:00-22:00 HOUR	0.4	SE	ENE	ENE
22:00-23:00 HOUR	2.5	SE	ENE	ENE
23:00-00:00 HOUR	2.0	ESE	ENE	ENE
00:00-01:00 HOUR	1.6	ESE	ENE	ENE
01:00-02:00 HOUR	2.3	ESE	ENE	ENE
02:00-03:00 HOUR	0.7	ESE	ENE	ENE
03:00-04:00 HOUR	1.8	ESE	ENE	ENE
04:00-05:00 HOUR	3.5	E	ENE	ENE
05:00-06:00 HOUR	2.3	E	ENE	ENE
06:00-07:00 HOUR	0.8	E	ENE	ENE

AUGUST 5, 2022

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## ANALYSIS REPORT

**CUSTOMER NAME** : BARRAJ ELECTRICITY GENERATING COMPANY LIMITED  
**ADDRESS** : 238 MARADITHWAS BANGKANGKINDRA CHONG NOISE YAN NAWA BANGKOK 10120  
**CONTACT INFORMATION** : TEL : 09 5992 6395 e-mail : Safety@uaec.com  
**MEASURING SOURCE** : 57m (height)  
**MEASURING TYPE** : AMBIENT (NOISE)  
**MEASURING DATE** : DECEMBER 15-22, 2022  
**MEASURING TIME** : \*  
**MEASURING METHOD** : INTEGRATED SOUND LEVEL METER  
**MEASURED BY** : [REDACTED]  
**ANALYSIS NO.** : T22A2601-0001 - T22A2601-0007  
**RECEIVED DATE** : DECEMBER 15-22, 2022  
**ANALYTICAL DATE** : DECEMBER 15-22, 2022  
**REPORT NO.** : 2022-103682  
**WORK NO.** : 2022-009705

TIME*	RESULT dB(A)	
	Level 1 hour	Level 8 hour
07:00-08:00 HOUR	84.1	83.6
08:00-09:00 HOUR	84.5	84.0
09:00-10:00 HOUR	84.2	83.3
10:00-11:00 HOUR	85.3	84.5
11:00-12:00 HOUR	85.4	84.2
12:00-13:00 HOUR	85.2	83.4
13:00-14:00 HOUR	85.2	84.8
14:00-15:00 HOUR	85.0	84.4
15:00-16:00 HOUR	85.3	84.1
16:00-17:00 HOUR	85.1	83.5
17:00-18:00 HOUR	85.2	84.7
18:00-19:00 HOUR	85.0	84.3
19:00-20:00 HOUR	85.8	85.0
20:00-21:00 HOUR	85.7	85.2
21:00-22:00 HOUR	83.6	82.8
22:00-23:00 HOUR	83.1	82.3
23:00-00:00 HOUR	82.3	81.5
00:00-01:00 HOUR	81.9	82.1
01:00-02:00 HOUR	81.9	81.2
02:00-03:00 HOUR	82.4	81.8
03:00-04:00 HOUR	82.1	81.5
04:00-05:00 HOUR	82.8	82.0
05:00-06:00 HOUR	82.9	82.0
06:00-07:00 HOUR	82.6	81.6

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REG-178-178 17825  
TESTING R287

TIME*	RESULT db(A)		
	Sub-structure Test results		
	DECEMBER 16-17, 2022		
	T22A-2601-0002		
	Layer 1 hour	Layer 2 hour	Layer 2 hour
07:00-08:00 HOUR	83.1	85.1	82.3
08:00-09:00 HOUR	83.5	85.7	82.6
09:00-10:00 HOUR	83.5	85.7	82.8
10:00-11:00 HOUR	83.6	85.4	83.1
11:00-12:00 HOUR	83.5	85.3	82.8
12:00-13:00 HOUR	83.2	85.4	82.5
13:00-14:00 HOUR	83.5	85.2	83.0
14:00-15:00 HOUR	83.9	85.3	81.9
15:00-16:00 HOUR	83.5	85.3	82.9
16:00-17:00 HOUR	83.6	86.0	82.5
17:00-18:00 HOUR	82.8	85.3	81.6
18:00-19:00 HOUR	83.5	85.1	82.9
19:00-20:00 HOUR	83.2	85.2	82.0
20:00-21:00 HOUR	82.8	85.3	81.7
21:00-22:00 HOUR	83.9	86.4	83.2
22:00-23:00 HOUR	83.3	84.9	82.8
23:00-00:00 HOUR	83.0	86.2	82.1
00:00-01:00 HOUR	83.4	86.2	82.0
01:00-02:00 HOUR	86.6	92.2	81.2
02:00-03:00 HOUR	85.7	91.1	82.7
03:00-04:00 HOUR	82.7	85.1	82.0
04:00-05:00 HOUR	83.1	85.4	81.9
05:00-06:00 HOUR	82.1	84.8	81.3
06:00-07:00 HOUR	82.8	85.3	82.0
Layer 24 hours			83.6

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2022-11-03-062



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REG-178-178 17825  
TESTING R287

TIME*	RESULT db(A)		
	Sub-structure Test results		
	DECEMBER 17-18, 2022		
	T22A-2601-0003		
	Layer 1 hour	Layer 2 hour	Layer 24 hour
07:00-08:00 HOUR	82.5	84.1	81.9
08:00-09:00 HOUR	82.8	84.9	81.9
09:00-10:00 HOUR	82.4	84.6	81.6
10:00-11:00 HOUR	82.6	84.4	81.5
11:00-12:00 HOUR	82.4	84.5	81.5
12:00-13:00 HOUR	83.1	84.3	82.2
13:00-14:00 HOUR	82.2	85.6	81.4
14:00-15:00 HOUR	83.8	89.4	82.8
15:00-16:00 HOUR	83.4	87.2	82.6
16:00-17:00 HOUR	83.3	85.1	82.8
17:00-18:00 HOUR	80.6	87.8	75.3
18:00-19:00 HOUR	78.7	80.7	77.6
19:00-20:00 HOUR	78.3	80.4	77.5
20:00-21:00 HOUR	78.4	80.2	77.9
21:00-22:00 HOUR	78.4	80.6	76.0
22:00-23:00 HOUR	76.4	78.6	75.3
23:00-00:00 HOUR	76.6	79.9	75.0
00:00-01:00 HOUR	76.3	78.5	75.6
01:00-02:00 HOUR	76.7	79.0	75.6
02:00-03:00 HOUR	77.3	86.8	75.6
03:00-04:00 HOUR	76.9	82.6	75.8
04:00-05:00 HOUR	76.3	79.3	75.2
05:00-06:00 HOUR	76.5	80.0	74.8
06:00-07:00 HOUR	75.0	77.1	74.5
Layer 24 hours		80.6	

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RSC-118-118 11745  
TESTING 1027

TIME*	RESULT dB(A)	
	1st Measurement	2nd Measurement
DECEMBER 19-19, 2022		
T22A2601-0004		
07:00-08:00 HOUR	74.9	74.6
08:00-09:00 HOUR	75.4	75.1
09:00-10:00 HOUR	75.6	75.3
10:00-11:00 HOUR	75.5	75.6
11:00-12:00 HOUR	74.7	74.7
12:00-13:00 HOUR	75.3	74.3
13:00-14:00 HOUR	75.3	74.3
14:00-15:00 HOUR	75.7	74.5
15:00-16:00 HOUR	76.2	74.4
16:00-17:00 HOUR	75.9	74.3
17:00-18:00 HOUR	75.4	74.8
18:00-19:00 HOUR	75.5	74.5
19:00-20:00 HOUR	75.6	74.9
20:00-21:00 HOUR	76.4	74.6
21:00-22:00 HOUR	75.5	74.8
22:00-23:00 HOUR	76.1	74.9
23:00-00:00 HOUR	75.8	75.3
00:00-01:00 HOUR	77.5	77.1
01:00-02:00 HOUR	75.5	74.5
02:00-03:00 HOUR	76.6	74.6
03:00-04:00 HOUR	76.2	75.9
04:00-05:00 HOUR	79.7	75.5
05:00-06:00 HOUR	77.0	75.3
06:00-07:00 HOUR	77.2	74.6
Long 24 hours	75.2	

NO PERSONS ENTERED  
NO MACHINES OPERATED  
or no other (indicated) on site

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2022-0303682



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RSC-118-118 11833  
TESTING 1027

TIME*	RESULT dB(A)	
	1st Measurement	2nd Measurement
DECEMBER 19-20, 2022		
T22A2601-0005		
07:00-08:00 HOUR	75.5	77.2
08:00-09:00 HOUR	75.9	76.3
09:00-10:00 HOUR	76.1	76.1
10:00-11:00 HOUR	75.6	80.3
11:00-12:00 HOUR	76.2	80.3
12:00-13:00 HOUR	76.4	81.0
13:00-14:00 HOUR	76.1	77.8
14:00-15:00 HOUR	76.7	84.3
15:00-16:00 HOUR	77.0	80.0
16:00-17:00 HOUR	78.1	81.3
17:00-18:00 HOUR	79.7	88.0
18:00-19:00 HOUR	76.4	80.1
19:00-20:00 HOUR	76.4	79.4
20:00-21:00 HOUR	75.3	81.0
21:00-22:00 HOUR	76.2	78.5
22:00-23:00 HOUR	75.0	76.2
23:00-00:00 HOUR	75.5	77.0
00:00-01:00 HOUR	76.2	77.2
01:00-02:00 HOUR	76.1	79.0
02:00-03:00 HOUR	76.1	77.4
03:00-04:00 HOUR	77.2	81.8
04:00-05:00 HOUR	76.9	78.3
05:00-06:00 HOUR	75.6	80.1
06:00-07:00 HOUR	75.3	79.3
Long 24 hours	76.4	

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NO MACHINES OPERATED  
or no other (indicated) on site

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REG-119-116 11915  
TESTING 0207

TIME*	RESULT dB(A)	
	Leq 1 hour	Leq 24 hours
07:00-08:00 HOUR	75.8	77.1
08:00-09:00 HOUR	76.0	75.4
09:00-10:00 HOUR	74.2	76.7
10:00-11:00 HOUR	74.0	73.8
11:00-12:00 HOUR	73.8	73.6
12:00-13:00 HOUR	74.1	73.4
13:00-14:00 HOUR	73.5	73.3
14:00-15:00 HOUR	73.5	73.1
15:00-16:00 HOUR	73.6	73.2
16:00-17:00 HOUR	73.5	73.1
17:00-18:00 HOUR	73.4	73.1
18:00-19:00 HOUR	73.1	72.9
19:00-20:00 HOUR	73.5	72.8
20:00-21:00 HOUR	74.8	72.6
21:00-22:00 HOUR	74.5	74.0
22:00-23:00 HOUR	74.9	73.9
23:00-00:00 HOUR	74.8	74.5
00:00-01:00 HOUR	74.6	74.3
01:00-02:00 HOUR	74.4	73.9
02:00-03:00 HOUR	74.2	73.8
03:00-04:00 HOUR	74.3	73.8
04:00-05:00 HOUR	74.4	73.6
05:00-06:00 HOUR	74.6	74.0
06:00-07:00 HOUR	74.9	74.0
Leq 24 hours		74.3

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REG-119-116 11915  
TESTING 0207

TIME*	RESULT dB(A)	
	Leq 1 hour	Leq 24 hours
07:00-08:00 HOUR	75.2	76.7
08:00-09:00 HOUR	75.2	77.8
09:00-10:00 HOUR	75.0	76.3
10:00-11:00 HOUR	75.6	76.9
11:00-12:00 HOUR	75.3	76.5
12:00-13:00 HOUR	76.4	76.7
13:00-14:00 HOUR	77.2	76.5
14:00-15:00 HOUR	77.1	79.0
15:00-16:00 HOUR	77.1	78.9
16:00-17:00 HOUR	78.0	84.6
17:00-18:00 HOUR	77.5	80.5
18:00-19:00 HOUR	77.4	78.9
19:00-20:00 HOUR	77.2	78.9
20:00-21:00 HOUR	77.1	78.9
21:00-22:00 HOUR	76.8	78.5
22:00-23:00 HOUR	77.0	80.7
23:00-00:00 HOUR	76.8	78.6
00:00-01:00 HOUR	76.9	80.1
01:00-02:00 HOUR	76.6	79.3
02:00-03:00 HOUR	76.6	81.8
03:00-04:00 HOUR	76.6	79.1
04:00-05:00 HOUR	76.8	81.3
05:00-06:00 HOUR	76.7	82.0
06:00-07:00 HOUR	76.9	79.9
Leq 24 hours		76.7

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NSC-TISI-TIS 17825  
TESTING 0077

### ANALYSIS REPORT

**CUSTOMER NAME** : BANGKAI ELECTRICITY GENERATING COMPANY LIMITED  
**ADDRESS** : 238 NARADHIWONG ROAD, BANGKOK 10120  
**CONTACT INFORMATION** : TEL : 09 5932 6395 E-mail : Safety@bessk@bessk.com

**MEASURING SOURCE** : AMBIENT (NOISE)  
**MEASURING TYPE** : AMBIENT (NOISE)  
**MEASURING DATE** : DECEMBER 15-22, 2022  
**MEASURING TIME** : \*  
**MEASURING METHOD** : INTEGRATED SOUND LEVEL METER  
**MEASURED BY** : [REDACTED]

**RECEIVED DATE** : DECEMBER 15-22, 2022  
**ANALYTICAL DATE** : DECEMBER 15-21, 2022  
**REPORT NO.** : 2022-U103683  
**WORK NO.** : 2022-007905  
**ANALYSIS NO.** : T22A2601-0008 - T22A2601-0014

TIME	RESULT dB(A)		
	Lower 1 hour	Lower 2 hour	Lower 3 hour
07:00-08:00 HOUR	45.1	56.9	43.4
08:00-09:00 HOUR	46.6	63.0	44.1
09:00-10:00 HOUR	46.3	56.3	44.8
10:00-11:00 HOUR	47.5	60.8	43.2
11:00-12:00 HOUR	47.4	65.8	44.8
12:00-13:00 HOUR	46.9	58.7	44.1
13:00-14:00 HOUR	48.3	64.4	44.4
14:00-15:00 HOUR	47.3	58.1	45.9
15:00-16:00 HOUR	47.7	68.4	45.6
16:00-17:00 HOUR	47.7	58.3	44.8
17:00-18:00 HOUR	46.7	58.1	44.8
18:00-19:00 HOUR	47.5	59.6	44.8
19:00-20:00 HOUR	45.7	59.8	43.1
20:00-21:00 HOUR	46.4	64.8	43.7
21:00-22:00 HOUR	49.2	65.4	44.7
22:00-23:00 HOUR	48.9	62.8	45.9
23:00-00:00 HOUR	50.4	62.4	46.1
00:00-01:00 HOUR	50.9	64.9	46.4
01:00-02:00 HOUR	48.9	61.7	45.8
02:00-03:00 HOUR	48.5	62.4	43.2
03:00-04:00 HOUR	44.7	60.4	41.2
04:00-05:00 HOUR	43.0	60.2	39.7
05:00-06:00 HOUR	43.2	59.3	38.3
06:00-07:00 HOUR	47.7	73.6	39.1
Lang. 24 hours		47.6	

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NSC-TISI-TIS 17825  
TESTING 0077

TIME	RESULT dB(A)		
	Lower 1 hour	Lower 2 hour	Lower 3 hour
07:00-08:00 HOUR	48.7	69.4	38.5
08:00-09:00 HOUR	47.2	64.2	38.3
09:00-10:00 HOUR	47.3	66.9	37.2
10:00-11:00 HOUR	44.2	65.7	37.9
11:00-12:00 HOUR	43.7	68.2	37.2
12:00-13:00 HOUR	46.8	69.3	37.3
13:00-14:00 HOUR	43.2	60.1	37.0
14:00-15:00 HOUR	44.0	63.1	37.5
15:00-16:00 HOUR	43.3	69.6	36.3
16:00-17:00 HOUR	45.2	60.3	38.7
17:00-18:00 HOUR	45.1	61.5	37.0
18:00-19:00 HOUR	46.2	61.4	40.1
19:00-20:00 HOUR	45.4	62.7	39.0
20:00-21:00 HOUR	46.1	64.2	39.5
21:00-22:00 HOUR	46.9	64.8	40.4
22:00-23:00 HOUR	49.6	62.0	42.5
23:00-00:00 HOUR	45.6	59.9	41.2
00:00-01:00 HOUR	46.0	64.0	39.1
01:00-02:00 HOUR	46.9	72.6	42.6
02:00-03:00 HOUR	48.8	59.7	47.1
03:00-04:00 HOUR	49.4	65.0	46.7
04:00-05:00 HOUR	49.7	68.2	46.3
05:00-06:00 HOUR	47.1	61.7	45.3
06:00-07:00 HOUR	47.9	57.6	45.9
Lang. 24 hours		47.1	

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NSC-TIS-17028  
TESTING #307

TIME*	RESULT (kg(A))		
	รวมผล (รวมผลทั้งหมด)		
	DECEMBER 17-18, 2022		
	T22A2801-0010		
	Layer 1 hour	Layer 2 hour	Layer 3 hour
07:00-08:00 HOUR	63.2	48.1	46.0
08:00-09:00 HOUR	63.4	48.1	45.3
09:00-10:00 HOUR	61.0	47.6	45.4
10:00-11:00 HOUR	62.3	47.5	45.6
11:00-12:00 HOUR	56.2	46.6	45.0
12:00-13:00 HOUR	56.1	45.6	43.7
13:00-14:00 HOUR	60.1	47.3	44.6
14:00-15:00 HOUR	58.5	46.2	44.4
15:00-16:00 HOUR	57.1	44.9	43.6
16:00-17:00 HOUR	50.3	45.4	43.6
17:00-18:00 HOUR	51.8	45.0	43.8
18:00-19:00 HOUR	46.5	45.7	43.7
19:00-20:00 HOUR	62.1	46.2	44.3
20:00-21:00 HOUR	53.8	45.7	44.4
21:00-22:00 HOUR	65.5	49.6	44.2
22:00-23:00 HOUR	66.2	53.5	45.1
23:00-00:00 HOUR	71.8	49.5	46.1
00:00-01:00 HOUR	61.4	50.7	46.8
01:00-02:00 HOUR	66.5	46.9	44.6
02:00-03:00 HOUR	58.6	46.9	43.3
03:00-04:00 HOUR	58.8	44.6	40.5
04:00-05:00 HOUR	61.6	45.7	42.2
05:00-06:00 HOUR	64.1	45.4	40.7
06:00-07:00 HOUR	64.2	46.8	39.7
Layer 24 hours	47.7		

NO FURTHER COMMENT  
NOT NECESSARY COMMENT  
IF NO GROUP (HOURS) COLLECT

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NSC-TIS-17025  
TESTING #307

TIME*	RESULT (kg(A))		
	รวมผล (รวมผลทั้งหมด)		
	DECEMBER 18-19, 2022		
	T22A2801-0011		
	Layer 1 hour	Layer 2 hour	Layer 3 hour
07:00-08:00 HOUR	46.9	69.5	41.1
08:00-09:00 HOUR	46.0	76.8	40.5
09:00-10:00 HOUR	45.2	58.6	40.2
10:00-11:00 HOUR	43.0	55.1	38.9
11:00-12:00 HOUR	45.0	68.9	38.9
12:00-13:00 HOUR	44.3	63.6	38.5
13:00-14:00 HOUR	45.5	61.2	39.1
14:00-15:00 HOUR	44.3	64.1	38.8
15:00-16:00 HOUR	56.8	61.3	39.1
16:00-17:00 HOUR	46.3	61.2	39.1
17:00-18:00 HOUR	48.0	74.0	40.8
18:00-19:00 HOUR	46.7	64.1	39.8
19:00-20:00 HOUR	45.7	60.1	39.9
20:00-21:00 HOUR	47.8	63.5	39.7
21:00-22:00 HOUR	54.6	66.1	42.0
22:00-23:00 HOUR	50.8	59.6	46.1
23:00-00:00 HOUR	57.8	67.9	46.1
00:00-01:00 HOUR	53.2	64.9	46.5
01:00-02:00 HOUR	58.2	69.7	47.0
02:00-03:00 HOUR	53.6	64.2	46.3
03:00-04:00 HOUR	51.0	61.8	45.7
04:00-05:00 HOUR	52.4	61.4	46.5
05:00-06:00 HOUR	52.4	63.9	46.0
06:00-07:00 HOUR	48.9	63.0	45.6
Layer 24 hours	51.8		

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IF NO GROUP (HOURS) COLLECT

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MSC-119-115 11915  
TESTING DAY

TIME*	RESULT (dB(A))		
	วันพฤหัสบดี (พฤหัสบดีที่) ธันวาคม 19-20, 2022		
	T22A2601-0012		
	Leq 1 hour	Leq 2 hour	Leq 3 hour
07:00-08:00 HOUR	57.6	65.3	47.6
08:00-09:00 HOUR	56.4	70.6	53.9
09:00-10:00 HOUR	56.8	61.4	52.7
10:00-11:00 HOUR	53.7	60.0	47.7
11:00-12:00 HOUR	48.4	51.2	42.3
12:00-13:00 HOUR	48.4	51.2	42.2
13:00-14:00 HOUR	48.7	51.6	47.4
14:00-15:00 HOUR	48.1	54.6	46.7
15:00-16:00 HOUR	47.2	54.3	45.7
16:00-17:00 HOUR	46.4	54.7	44.9
17:00-18:00 HOUR	52.1	59.9	49.9
18:00-19:00 HOUR	54.9	57.8	53.5
19:00-20:00 HOUR	52.6	59.8	42.8
20:00-21:00 HOUR	43.5	50.2	41.9
21:00-22:00 HOUR	46.3	64.9	42.8
22:00-23:00 HOUR	45.7	62.0	42.8
23:00-00:00 HOUR	48.2	62.1	42.2
00:00-01:00 HOUR	49.0	69.5	42.3
01:00-02:00 HOUR	49.5	76.5	41.9
02:00-03:00 HOUR	48.6	67.1	41.2
03:00-04:00 HOUR	44.7	60.6	40.3
04:00-05:00 HOUR	47.5	65.8	40.4
05:00-06:00 HOUR	44.7	64.8	40.6
06:00-07:00 HOUR	46.5	64.7	41.4
Leq 24 hours		51.4	

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MSC-119-115 11921  
TESTING DAY

TIME*	RESULT (dB(A))		
	วันพฤหัสบดี (พฤหัสบดีที่) ธันวาคม 20-21, 2022		
	T22A2601-0013		
	Leq 1 hour	Leq 2 hour	Leq 3 hour
07:00-08:00 HOUR	46.4	62.3	41.3
08:00-09:00 HOUR	45.3	57.3	40.9
09:00-10:00 HOUR	47.1	58.9	41.2
10:00-11:00 HOUR	46.2	62.8	41.6
11:00-12:00 HOUR	45.9	63.0	40.7
12:00-13:00 HOUR	46.7	61.1	41.4
13:00-14:00 HOUR	49.0	67.4	41.8
14:00-15:00 HOUR	47.4	66.0	40.5
15:00-16:00 HOUR	46.4	59.9	42.5
16:00-17:00 HOUR	47.4	67.0	40.8
17:00-18:00 HOUR	47.4	64.2	42.6
18:00-19:00 HOUR	46.1	59.1	41.8
19:00-20:00 HOUR	47.3	68.8	40.4
20:00-21:00 HOUR	48.8	75.6	40.6
21:00-22:00 HOUR	44.0	53.6	39.9
22:00-23:00 HOUR	48.2	64.5	43.1
23:00-00:00 HOUR	56.2	61.9	44.6
00:00-01:00 HOUR	55.5	61.0	53.7
01:00-02:00 HOUR	55.6	62.1	53.8
02:00-03:00 HOUR	46.0	71.0	38.2
03:00-04:00 HOUR	44.3	62.5	36.9
04:00-05:00 HOUR	45.6	69.1	37.8
05:00-06:00 HOUR	52.5	67.1	38.3
06:00-07:00 HOUR	50.0	72.2	39.3
Leq 24 hours		49.9	

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TIME*	RESULT dB(A)		
	ตามมาตรฐาน		
	T22A2501-0016		
TIME*	Level 1 hour	Level 2 hour	Level 3 hour
07:00-08:00 HOUR	47.5	61.6	44.4
08:00-09:00 HOUR	48.0	61.9	44.9
09:00-10:00 HOUR	46.8	60.5	44.5
10:00-11:00 HOUR	47.6	59.6	44.5
11:00-12:00 HOUR	50.5	66.5	45.6
12:00-13:00 HOUR	49.0	56.4	46.6
13:00-14:00 HOUR	47.2	57.2	44.2
14:00-15:00 HOUR	47.0	58.3	44.2
15:00-16:00 HOUR	45.5	59.9	43.0
16:00-17:00 HOUR	47.0	58.7	43.9
17:00-18:00 HOUR	46.1	59.9	43.9
18:00-19:00 HOUR	46.2	60.6	45.6
19:00-20:00 HOUR	46.2	58.2	45.3
20:00-21:00 HOUR	47.5	60.5	45.1
21:00-22:00 HOUR	47.3	54.5	44.9
22:00-23:00 HOUR	46.4	55.4	44.1
23:00-00:00 HOUR	47.3	53.1	44.8
00:00-01:00 HOUR	48.2	57.1	46.7
01:00-02:00 HOUR	48.9	54.9	46.8
02:00-03:00 HOUR	49.4	59.9	47.0
03:00-04:00 HOUR	51.0	56.7	49.6
04:00-05:00 HOUR	51.1	62.9	48.8
05:00-06:00 HOUR	46.0	54.5	44.2
06:00-07:00 HOUR	46.8	55.6	43.2
L Avg 24 hours			
		46.2	

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TIME*	RESULT dB(A)		
	ตามมาตรฐาน		
	T22A2501-0017		
TIME*	Level 1 hour	Level 2 hour	Level 3 hour
07:00-08:00 HOUR	44.6	53.4	43.1
08:00-09:00 HOUR	46.7	65.0	42.7
09:00-10:00 HOUR	45.8	65.3	43.3
10:00-11:00 HOUR	45.9	58.5	43.4
11:00-12:00 HOUR	47.8	60.5	42.9
12:00-13:00 HOUR	45.2	63.6	42.3
13:00-14:00 HOUR	44.7	54.3	42.2
14:00-15:00 HOUR	46.3	60.6	43.5
15:00-16:00 HOUR	45.0	54.2	43.1
16:00-17:00 HOUR	45.9	54.5	44.1
17:00-18:00 HOUR	46.9	60.6	44.2
18:00-19:00 HOUR	45.2	54.2	42.7
19:00-20:00 HOUR	46.5	61.8	44.9
20:00-21:00 HOUR	47.8	56.8	44.8
21:00-22:00 HOUR	54.5	82.7	45.0
22:00-23:00 HOUR	51.0	63.6	46.6
23:00-00:00 HOUR	52.1	70.3	47.7
00:00-01:00 HOUR	51.3	65.8	47.1
01:00-02:00 HOUR	49.6	62.3	45.9
02:00-03:00 HOUR	48.5	60.4	46.1
03:00-04:00 HOUR	46.3	58.6	44.1
04:00-05:00 HOUR	44.5	53.8	42.2
05:00-06:00 HOUR	43.9	55.1	39.7
06:00-07:00 HOUR	43.5	57.8	38.7
L Avg 24 hours			
		48.4	

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MSC-T18-T18 17931  
TESTING R207

TIME*	RESULT (dB(A))		
	17/10/2022		
	T22A-2601-0018		
	Leq 1 hour	Leq 2 hour	Leq 3 hour
07:00-08:00 HOUR	43.0	54.5	39.1
08:00-09:00 HOUR	47.0	65.4	38.0
09:00-10:00 HOUR	42.6	57.4	38.5
10:00-11:00 HOUR	47.4	61.3	38.3
11:00-12:00 HOUR	41.0	52.0	37.9
12:00-13:00 HOUR	42.1	59.3	38.4
13:00-14:00 HOUR	41.8	51.8	37.6
14:00-15:00 HOUR	41.9	54.7	38.8
15:00-16:00 HOUR	42.3	53.6	37.6
16:00-17:00 HOUR	40.9	56.2	37.9
17:00-18:00 HOUR	48.3	68.9	38.2
18:00-19:00 HOUR	45.0	65.4	38.4
19:00-20:00 HOUR	43.2	61.2	38.0
20:00-21:00 HOUR	41.7	59.3	37.0
21:00-22:00 HOUR	42.3	59.0	38.0
22:00-23:00 HOUR	41.6	56.2	38.2
23:00-00:00 HOUR	41.8	55.3	37.5
00:00-01:00 HOUR	42.2	55.1	37.7
01:00-02:00 HOUR	42.6	55.7	36.7
02:00-03:00 HOUR	42.2	55.2	37.5
03:00-04:00 HOUR	53.6	81.0	38.5
04:00-05:00 HOUR	42.2	60.0	37.7
05:00-06:00 HOUR	42.9	56.1	38.1
06:00-07:00 HOUR	46.5	66.0	38.2
Leq 24 hours		44.9	

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MSC-T18-T18 17929  
TESTING R207

TIME*	RESULT (dB(A))		
	17/10/2022		
	T22A-2601-0019		
	Leq 1 hour	Leq 2 hour	Leq 3 hour
07:00-08:00 HOUR	52.6	61.1	38.6
08:00-09:00 HOUR	46.3	61.0	39.3
09:00-10:00 HOUR	45.4	65.0	39.0
10:00-11:00 HOUR	43.0	54.3	38.6
11:00-12:00 HOUR	47.5	66.6	39.2
12:00-13:00 HOUR	45.6	57.9	39.5
13:00-14:00 HOUR	44.2	60.7	39.0
14:00-15:00 HOUR	47.2	62.9	39.0
15:00-16:00 HOUR	47.1	66.2	38.4
16:00-17:00 HOUR	43.7	55.7	38.6
17:00-18:00 HOUR	43.7	62.8	39.1
18:00-19:00 HOUR	46.9	61.7	40.6
19:00-20:00 HOUR	47.4	62.0	43.4
20:00-21:00 HOUR	47.5	57.1	45.2
21:00-22:00 HOUR	49.9	60.1	46.3
22:00-23:00 HOUR	52.1	62.0	50.8
23:00-00:00 HOUR	51.8	66.8	48.8
00:00-01:00 HOUR	52.6	61.8	50.6
01:00-02:00 HOUR	52.4	60.0	50.2
02:00-03:00 HOUR	51.3	61.1	48.6
03:00-04:00 HOUR	50.6	61.0	49.0
04:00-05:00 HOUR	49.0	56.6	47.1
05:00-06:00 HOUR	49.4	59.4	47.6
06:00-07:00 HOUR	48.3	57.9	45.6
Leq 24 hours		49.1	

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2022-UJ00684

TIME	RESULT @ (A) TUESDAY		
	DECEMBER 20-21, 2022		
	T22A2500-0030		
	Lesson 1 hour	Lesson 2 hour	Lesson 3 hour
07:00-08:00 HOUR	47.2	57.3	45.7
08:00-09:00 HOUR	48.6	59.1	45.8
09:00-10:00 HOUR	50.1	67.2	45.8
10:00-11:00 HOUR	48.7	63.5	45.7
11:00-12:00 HOUR	50.4	55.2	46.4
12:00-13:00 HOUR	46.1	54.8	44.4
13:00-14:00 HOUR	47.9	56.2	44.8
14:00-15:00 HOUR	45.5	52.9	43.9
15:00-16:00 HOUR	49.4	58.4	45.4
16:00-17:00 HOUR	45.6	51.5	44.0
17:00-18:00 HOUR	47.7	56.2	45.0
18:00-19:00 HOUR	49.7	57.5	46.8
19:00-20:00 HOUR	50.1	62.8	47.0
20:00-21:00 HOUR	46.8	52.4	45.5
21:00-22:00 HOUR	47.9	55.1	45.8
22:00-23:00 HOUR	45.5	53.6	43.5
23:00-00:00 HOUR	47.8	56.9	45.3
00:00-01:00 HOUR	48.2	61.0	44.8
01:00-02:00 HOUR	47.2	53.4	45.5
02:00-03:00 HOUR	45.5	54.7	43.4
03:00-04:00 HOUR	48.8	65.5	43.0
04:00-05:00 HOUR	45.5	54.1	43.8
05:00-06:00 HOUR	45.7	54.8	43.7
06:00-07:00 HOUR	46.7	55.7	44.4
<b>LESSON 200 hours</b>		<b>47.9</b>	

TIME	RESULT d(4)		
	UTILISATION		
	DECEMBER 21-22, 2022		
	T22A0001-0021		
	Leg 1 hour	Leg 2 hour	Leg 3 hour
07:00-08:00 HOUR	45.0	50.6	44.0
08:00-09:00 HOUR	45.0	50.6	42.8
09:00-10:00 HOUR	44.1	55.8	42.4
10:00-11:00 HOUR	46.9	61.9	41.9
11:00-12:00 HOUR	46.1	55.9	42.8
12:00-13:00 HOUR	46.4	56.4	43.7
13:00-14:00 HOUR	47.0	51.1	45.7
14:00-15:00 HOUR	47.5	52.5	46.4
15:00-16:00 HOUR	47.8	55.1	45.8
16:00-17:00 HOUR	47.9	54.1	45.8
17:00-18:00 HOUR	47.7	58.7	45.6
18:00-19:00 HOUR	47.8	59.5	45.6
19:00-20:00 HOUR	47.8	59.0	44.8
20:00-21:00 HOUR	46.4	64.2	46.2
21:00-22:00 HOUR	49.7	63.9	46.5
22:00-23:00 HOUR	50.6	61.6	47.5
23:00-00:00 HOUR	52.5	64.1	48.0
00:00-01:00 HOUR	50.5	60.7	47.8
01:00-02:00 HOUR	46.9	60.7	46.2
02:00-03:00 HOUR	47.4	58.9	45.0
03:00-04:00 HOUR	48.0	67.2	44.3
04:00-05:00 HOUR	47.3	61.5	43.3
05:00-06:00 HOUR	50.0	67.7	41.1
06:00-07:00 HOUR	47.6	65.0	40.4
<b>LEG 1-300 200 hours</b>		<b>46.3</b>	



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### ANALYSIS REPORT

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**CONTACT INFORMATION** : TEL : 09 5992 6395 E-mail : Safety@banrai.com  
**SAMPLING SOURCE** : BANRAI ELECTRICITY GENERATING COMPANY LIMITED  
**SAMPLE TYPE** : STACK  
**SAMPLING DATE** : DECEMBER 15, 2022  
**SAMPLING TIME** : 10:00-10:48 HOUR  
**SAMPLING BY** : [REDACTED]  
**ANALYZED BY** : [REDACTED]

**RECEIVED DATE** : DECEMBER 16, 2022  
**ANALYTICAL DATE** : DECEMBER 16-22, 2022  
**REPORT NO.** : 2022-1108099  
**WORK NO.** : 2022-009705  
**ANALYSIS NO.** : T22A2105-0001

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	
TOTAL SUSPENDED PARTICULATE	mg/m <sup>3</sup>	ISOKINETIC GRAVIMETRIC METHOD (US EPA METHOD 5)	BOILER NO.9 T22A2105-0001	
			ACTUAL OXYGEN	7% OXYGEN
			478	691
SAMPLE CONDITION			COMPLETE	

REMARK : REFERENCE CONDITION IS 25 DEGREE CELSIUS AT 1 ATMOSPHERE AND DRY BASIS.

### ANALYSIS REPORT

**CUSTOMER NAME** : BANRAI ELECTRICITY GENERATING COMPANY LIMITED  
**ADDRESS** : 101 MOO 12 THAP LUANG BAN RAI UTHAI THANI 61140  
**CONTACT INFORMATION** : TEL : 09 5992 6395 E-mail : Safety@banrai.com  
**MEASURING SOURCE** : BANRAI ELECTRICITY GENERATING COMPANY LIMITED  
**MEASURING TYPE** : STACK  
**MEASURING DATE** : DECEMBER 15, 2022  
**MEASURING TIME** : 10:10-10:20 HOUR  
**MEASURING METHOD** : U.S. EPA METHOD 8C.7E  
**MEASURED BY** : [REDACTED]

**RECEIVED DATE** : DECEMBER 15, 2022  
**ANALYTICAL DATE** : DECEMBER 15, 2022  
**REPORT NO.** : 2022-1108100  
**WORK NO.** : 2022-009705  
**ANALYSIS NO.** : T22A2105-0001

PARAMETER		UNIT	METHOD OF ANALYSIS	RESULT	
SULFUR DIOXIDE		ppm	PORTABLE ANALYZER, ELECTROCHEMICAL METHOD AT SITE (US EPA METHOD 8C)	BOLLER NO.9 T232405-0001	
				ACTUAL OXYGEN 7% OXYGEN	
OXIDES OF NITROGEN AS NITROGEN DIOXIDE		ppm	PORTABLE ANALYZER, ELECTROCHEMICAL METHOD AT SITE (US EPA METHOD 7E)	2	3
				80	146
SAMPLE CONDITION			COMPLETE		

REMARK

RESULT : REFERENCE CONDITION IS 25 DEGREE CELSIUS AT 1 ATMOSPHERE AND DRY BASIS.

DECEMBER 27, 2022

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### ANALYSIS REPORT

**CUSTOMER NAME** : BANHAI SUGAR INDUSTRY COMPANY LIMITED  
**ADDRESS** : 88 MOO 12 THAP LUANG BAN RAI UTHAI THANI 61140  
**CONTACT INFORMATION** : TEL : 09 5992 6395 e-mail : Safety@bhai.com  
**SAMPLING SOURCE** : WASTEWATER  
**SAMPLE TYPE** : WASTEWATER  
**SAMPLING DATE** : JULY 5, 2022  
**SAMPLING TIME** : 14:30 HOUR  
**SAMPLING METHOD** : GRAB  
**SAMPLING BY** : [REDACTED]  
**ANALYZED BY** : [REDACTED]

**RECEIVED DATE** : JULY 6, 2022  
**ANALYTICAL DATE** : JULY 6-15, 2022  
**REPORT NO.** : 2022-005968  
**WORK NO.** : 2022-000023  
**ANALYSIS NO.** : TZAN053-0001

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT measured standard (unit 1) TZAN053-0001	DETECTION LIMIT
pH <sup>a</sup>	-	ELECTROMETRIC METHOD AT SITE (SM 4500-H B)	8.8 (32°C)	-
TEMPERATURE <sup>c</sup>	°C	LABORATORY AND FIELD METHODS (SM 2550 B)	32	-
BIOCHEMICAL OXYGEN DEMAND <sup>a</sup>	mg/L	5-DAY BOD TEST, MEMBRANE ELECTRODE METHOD (SM 5210 B AND 4500-O C)	14.0	2.0
CHEMICAL OXYGEN DEMAND <sup>a</sup>	mg/L	CLOSED REFLEX, COLOURIMETRIC METHOD (SM 5220 D)	853	20.0
TOTAL DISSOLVED SOLIDS <sup>b</sup>	mg/L	DRIED AT 180 °C (SM 2540 C)	3395	25
TOTAL KJELDAHL NITROGEN <sup>c</sup>	mg/L	DIGESTION, DISTILLATION, TITRIMETRIC METHOD (SM 4500-NH3 C)	11.6	1.5
FAT, OIL AND GREASE <sup>a</sup>	mg/L	LIQUID-LIQUID, PARTITION-GRAVIMETRIC METHOD (SM 5520 B)	ND	3
<b>SAMPLE CONDITION</b> WATER'S COLOUR/TURBID SEDIMENT			BROWN/TURBID BROWN	

<sup>a</sup> : ISO/IEC 17025 ACCREDITED BY THAI INDUSTRIAL STANDARDS INSTITUTE (TISI)  
<sup>b</sup> : ISO/IEC 17025 ACCREDITED BY DEPARTMENT OF SCIENCE SERVICE (DSS)  
<sup>c</sup> : VERIFIED BY OWN LABORATORY QUALITY SYSTEM, BUT STILL NOT ACCREDITED

SM : STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 23<sup>rd</sup> EDITION, 2017.  
ND : NON-DETECTABLE

JULY 19, 2022

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### ANALYSIS REPORT

**CUSTOMER NAME** : BANHAI SUGAR INDUSTRY COMPANY LIMITED  
**ADDRESS** : 88 MOO 12 THAP LUANG BAN RAI UTHAI THANI 61140  
**CONTACT INFORMATION** : TEL : 09 5992 6395 e-mail : Safety@bhai.com  
**SAMPLING SOURCE** : WASTEWATER  
**SAMPLE TYPE** : WASTEWATER  
**SAMPLING DATE** : JULY 5, 2022  
**SAMPLING TIME** : 14:50 HOUR  
**SAMPLING METHOD** : GRAB  
**SAMPLING BY** : [REDACTED]  
**ANALYZED BY** : [REDACTED]

**RECEIVED DATE** : JULY 6, 2022  
**ANALYTICAL DATE** : JULY 6-15, 2022  
**REPORT NO.** : 2022-005969  
**WORK NO.** : 2022-000023  
**ANALYSIS NO.** : TZAN053-0002

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT measured standard (unit 1) TZAN053-0002	DETECTION LIMIT
pH <sup>a</sup>	-	ELECTROMETRIC METHOD AT SITE (SM 4500-H B)	8.8 (32°C)	5.5-9.0
TEMPERATURE <sup>c</sup>	°C	LABORATORY AND FIELD METHODS (SM 2550 B)	32	≤ 40
BIOCHEMICAL OXYGEN DEMAND <sup>a</sup>	mg/L	5-DAY BOD TEST, MEMBRANE ELECTRODE METHOD (SM 5210 B AND 4500-O C)	17.7	≤ 20
CHEMICAL OXYGEN DEMAND <sup>a</sup>	mg/L	CLOSED REFLEX, COLOURIMETRIC METHOD (SM 5220 D)	500	≤ 120
TOTAL DISSOLVED SOLIDS <sup>b</sup>	mg/L	DRIED AT 180 °C (SM 2540 C)	804	≤ 3,000
TOTAL KJELDAHL NITROGEN <sup>c</sup>	mg/L	DIGESTION, DISTILLATION, TITRIMETRIC METHOD (SM 4500-NH3 C)	6.1	≤ 100
FAT, OIL AND GREASE <sup>a</sup>	mg/L	LIQUID-LIQUID, PARTITION-GRAVIMETRIC METHOD (SM 5520 B)	ND	≤ 5
<b>SAMPLE CONDITION</b> WATER'S COLOUR/TURBID SEDIMENT			YELLOW/TURBID BROWN	

<sup>a</sup> : ISO/IEC 17025 ACCREDITED BY THAI INDUSTRIAL STANDARDS INSTITUTE (TISI)  
<sup>b</sup> : ISO/IEC 17025 ACCREDITED BY DEPARTMENT OF SCIENCE SERVICE (DSS)  
<sup>c</sup> : VERIFIED BY OWN LABORATORY QUALITY SYSTEM, BUT STILL NOT ACCREDITED

SM : STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 23<sup>rd</sup> EDITION, 2017.  
REGULATORY STANDARD : INDUSTRIAL EFFLUENT STANDARDS, NOTIFICATION OF THE MINISTRY OF INDUSTRY, B.E. 2560,  
PUBLISHED IN THE ROYAL GOVERNMENT GAZETTE, VOL. 134, PART 153 D, DATED JUNE 7, 2017.  
ND : NON-DETECTABLE

JULY 19, 2022

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## ANALYSIS REPORT

**CUSTOMER NAME** : BANGKAI SUGAR INDUSTRY COMPANY LIMITED  
**ADDRESS** : 88 MOO 12 THAP LUANG BANG RAI UTHAI THANI 61140  
**CONTACT INFORMATION** : TEL : 09 5992 6395 E-mail : Safety@bangkai.com

**SAMPLING SOURCE** : WASTEWATER  
**SAMPLE TYPE** : WASTEWATER  
**SAMPLING DATE** : AUGUST 2, 2022  
**SAMPLING TIME** : 14:05 HOUR  
**SAMPLING METHOD** : GRAB  
**SAMPLING BY** : [REDACTED]  
**ANALYZED BY** : TZ2AP166-0001

**RECEIVED DATE** : AUGUST 3, 2022  
**ANALYTICAL DATE** : AUGUST 3-10, 2022  
**REPORT NO.** : 2022-0052457  
**WORK NO.** : 2022-000023  
**ANALYSIS NO.** : TZ2AP166-0001

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	DETECTION LIMIT
pH	-	ELECTROMETRIC METHOD AT SITE (SMT 4500-H B)	8.4 (32°C)	-
TEMPERATURE	°C	LABORATORY AND FIELD METHODS (SMT 2800 B)	32	-
BIOCHEMICAL OXYGEN DEMAND	mg/L	5-DAY BOD TEST, MEMBRANE ELECTRODE METHOD (SMT 5510 B AND 4800-O G)	8.4	2.0
CHEMICAL OXYGEN DEMAND	mg/L	CLOSED REFLEX, TITRIMETRIC METHOD (SMT 5520 C)	114	25.0
TOTAL DISSOLVED SOLIDS	mg/L	DRIED AT 100 °C (SMT 2540 C)	3,258	25
TOTAL KJELDAHL NITROGEN	mg/L	DIGESTION, DISTILLATION, TITRIMETRIC METHOD (SMT 4500-NRG C)	93.0	15
FAT, OIL AND GREASE	mg/L	LIQUID-LIQUID, PARTITION-GRAMMETRIC METHOD (SMT 5520 B)	ND	3
SAMPLE CONDITION			BROWN/LIQUID	
WATER'S COLOUR/TURBID			BROWN	
SEDIMENT				

\* : ISO/IEC 17025 ACCREDITED BY THAI INDUSTRIAL STANDARDS INSTITUTE (TISI)  
\* : ISO/IEC 17025 ACCREDITED BY DEPARTMENT OF SCIENCE SERVICE (DSS)  
\* : VERIFIED BY OWN LABORATORY QUALITY SYSTEM, BUT STILL NOT ACCREDITED  
SN : STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 23 "EDITION, 2017.  
ND : NON-DETECTABLE

AUGUST 16, 2022

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## ANALYSIS REPORT

**CUSTOMER NAME** : BANGKAI SUGAR INDUSTRY COMPANY LIMITED  
**ADDRESS** : 88 MOO 12 THAP LUANG BANG RAI UTHAI THANI 61140  
**CONTACT INFORMATION** : TEL : 09 5992 6395 E-mail : Safety@bangkai.com

**SAMPLING SOURCE** : WASTEWATER  
**SAMPLE TYPE** : WASTEWATER  
**SAMPLING DATE** : AUGUST 2, 2022  
**SAMPLING TIME** : 14:20 HOUR  
**SAMPLING METHOD** : GRAB  
**SAMPLING BY** : [REDACTED]  
**ANALYZED BY** : TZ2AP166-0002

**RECEIVED DATE** : AUGUST 3, 2022  
**ANALYTICAL DATE** : AUGUST 3-10, 2022  
**REPORT NO.** : 2022-0052458  
**WORK NO.** : 2022-000023  
**ANALYSIS NO.** : TZ2AP166-0002

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT
pH	-	ELECTROMETRIC METHOD AT SITE (SMT 4500-H B)	8.6 (32°C)	5.5-9.0	-
TEMPERATURE	°C	LABORATORY AND FIELD METHODS (SMT 2800 B)	32	≤ 40	-
BIOCHEMICAL OXYGEN DEMAND	mg/L	5-DAY BOD TEST, MEMBRANE ELECTRODE METHOD (SMT 5510 B AND 4800-O G)	2.3	≤ 20	2.0
CHEMICAL OXYGEN DEMAND	mg/L	CLOSED REFLEX, TITRIMETRIC METHOD (SMT 5520 C)	ND	≤ 120	25.0
TOTAL DISSOLVED SOLIDS	mg/L	DRIED AT 100 °C (SMT 2540 C)	788	≤ 3,000	25
TOTAL KJELDAHL NITROGEN	mg/L	DIGESTION, DISTILLATION, TITRIMETRIC METHOD (SMT 4500-NRG C)	< LOQ	≤ 100	15
FAT, OIL AND GREASE	mg/L	LIQUID-LIQUID, PARTITION-GRAMMETRIC METHOD (SMT 5520 B)	ND	≤ 5	3
SAMPLE CONDITION					
WATER'S COLOUR/TURBID			YELLOW/CLAR		
SEDIMENT					

\* : ISO/IEC 17025 ACCREDITED BY THAI INDUSTRIAL STANDARDS INSTITUTE (TISI)  
\* : ISO/IEC 17025 ACCREDITED BY DEPARTMENT OF SCIENCE SERVICE (DSS)  
\* : VERIFIED BY OWN LABORATORY QUALITY SYSTEM, BUT STILL NOT ACCREDITED  
SN : STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 23 "EDITION, 2017.  
REGULATORY STANDARD : INDUSTRIAL EFFLUENT STANDARDS, NOTIFICATION OF THE MINISTRY OF INDUSTRY, B.E. 2560, PUBLISHED IN THE ROYAL GOVERNMENT GAZETTE, VOL. 04, PART 03 D, DATED JUNE 7, 2017.  
ND : NON-DETECTABLE  
< LOQ : < LIMIT OF QUANTIFICATION (TOTAL KJELDAHL NITROGEN ≥ 15 AND < 50 mg/L)

AUGUST 16, 2022

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### ANALYSIS REPORT

**CUSTOMER NAME** : BARNABAI SUGAR INDUSTRY COMPANY LIMITED  
**ADDRESS** : 88 MOO 12 THAP LUANG BAN RAI UTHAI THANI 61140  
**CONTACT INFORMATION** : TEL : 09 5952 6395 E-mail : Sateyditersa@tdnail.com  
**SAMPLING SOURCE** : WASTEWATER  
**SAMPLE TYPE** : WASTEWATER  
**SAMPLING DATE** : SEPTEMBER 6, 2022  
**SAMPLING TIME** : 14:20 HOUR  
**SAMPLING METHOD** : GRAB  
**SAMPLING BY** :  
**ANALYZED BY** :  
**RECEIVED DATE** : SEPTEMBER 7, 2022  
**ANALYTICAL DATE** : SEPTEMBER 7-14, 2022  
**REPORT NO.** : 2022-072259  
**WORK NO.** : 2022-000023  
**ANALYSIS NO.** : T22A0802-0001

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	DETECTION LIMIT
pH <sup>a</sup>	-	ELECTROMETRIC METHOD AT SITE (SM 4500-H <sup>+</sup> B)	7.4 (25°C)	-
TEMPERATURE <sup>c</sup>	°C	LABORATORY AND FIELD METHODS (SM 2550 B)	32	-
BIOCHEMICAL OXYGEN DEMAND <sup>a</sup>	mg/L	5-DAY BOD TEST, MEMBRANE ELECTRODE METHOD (SM 5210 B AND 4500-O <sub>2</sub> G)	466	2.0
CHEMICAL OXYGEN DEMAND <sup>a</sup>	mg/L	CLOSED REFLEX, COLOURIMETRIC METHOD (SM 5220 D)	920	25.0
TOTAL DISSOLVED SOLIDS <sup>b</sup>	mg/L	DRIED AT 180 °C (SM 2540 C)	4,425	25
TOTAL KJELDAHL NITROGEN <sup>c</sup>	mg/L	DIGESTION, DISTILLATION, TITRIMETRIC METHOD (SM 4500-NH <sub>3</sub> C)	16.4	15
FAT, OIL AND GREASE <sup>a</sup>	mg/L	LIQUID-LIQUID, PARTITION-GRAVIMETRIC METHOD (SM 5520 B)	ND	3
SAMPLE CONDITION WATER'S COLOUR/TURBID SEDIMENT			BROWN/TURBID BLACK	

<sup>a</sup> : ISO/IEC 17025 ACCREDITED BY THAI INDUSTRIAL STANDARDS INSTITUTE (TISI)  
<sup>b</sup> : ISO/IEC 17025 ACCREDITED BY DEPARTMENT OF SCIENCE SERVICE (DSS)  
<sup>c</sup> : VERIFIED BY OWN LABORATORY QUALITY SYSTEM, BUT STILL NOT ACCREDITED  
 SM : STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 23<sup>rd</sup> EDITION, 2017.  
 ND : NON-DETECTABLE

SEPTEMBER 20, 2022

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### ANALYSIS REPORT

**CUSTOMER NAME** : BARNABAI SUGAR INDUSTRY COMPANY LIMITED  
**ADDRESS** : 88 MOO 12 THAP LUANG BAN RAI UTHAI THANI 61140  
**CONTACT INFORMATION** : TEL : 09 5952 6395 E-mail : Sateyditersa@tdnail.com  
**SAMPLING SOURCE** : WASTEWATER  
**SAMPLE TYPE** : WASTEWATER  
**SAMPLING DATE** : SEPTEMBER 6, 2022  
**SAMPLING TIME** : 14:35 HOUR  
**SAMPLING METHOD** : GRAB  
**SAMPLING BY** :  
**ANALYZED BY** :  
**RECEIVED DATE** : SEPTEMBER 7, 2022  
**ANALYTICAL DATE** : SEPTEMBER 7-14, 2022  
**REPORT NO.** : 2022-072259  
**WORK NO.** : 2022-000023  
**ANALYSIS NO.** : T22A0802-0002

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	DETECTION LIMIT
pH <sup>a</sup>	-	ELECTROMETRIC METHOD AT SITE (SM 4500-H <sup>+</sup> B)	8.6 (25°C)	-
TEMPERATURE <sup>c</sup>	°C	LABORATORY AND FIELD METHODS (SM 2550 B)	32	-
BIOCHEMICAL OXYGEN DEMAND <sup>a</sup>	mg/L	5-DAY BOD TEST, MEMBRANE ELECTRODE METHOD (SM 5210 B AND 4500-O <sub>2</sub> G)	2.8	2.0
CHEMICAL OXYGEN DEMAND <sup>a</sup>	mg/L	CLOSED REFLEX, COLOURIMETRIC METHOD (SM 5220 D)	42.0	25.0
TOTAL DISSOLVED SOLIDS <sup>b</sup>	mg/L	DRIED AT 180 °C (SM 2540 C)	880	25
TOTAL KJELDAHL NITROGEN <sup>c</sup>	mg/L	DIGESTION, DISTILLATION, TITRIMETRIC METHOD (SM 4500-NH <sub>3</sub> C)	< LOQ	15
FAT, OIL AND GREASE <sup>a</sup>	mg/L	LIQUID-LIQUID, PARTITION-GRAVIMETRIC METHOD (SM 5520 B)	ND	3
SAMPLE CONDITION WATER'S COLOUR/TURBID SEDIMENT			BROWN/TURBID BLACK	

<sup>a</sup> : ISO/IEC 17025 ACCREDITED BY THAI INDUSTRIAL STANDARDS INSTITUTE (TISI)  
<sup>b</sup> : ISO/IEC 17025 ACCREDITED BY DEPARTMENT OF SCIENCE SERVICE (DSS)  
<sup>c</sup> : VERIFIED BY OWN LABORATORY QUALITY SYSTEM, BUT STILL NOT ACCREDITED  
 SM : STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 23<sup>rd</sup> EDITION, 2017.  
 REGULATORY STANDARD : INDUSTRIAL EFFLUENT STANDARDS, NOTIFICATION OF THE MINISTRY OF INDUSTRY, B.E. 2559,  
 PUBLISHED IN THE ROYAL GOVERNMENT GAZETTE, VOL. 134, PART 63 D, DATED JUNE 7, 2017.

ND : NON-DETECTABLE  
 < LOQ : < LIMIT OF QUANTIFICATION (TOTAL KJELDAHL NITROGEN ≥ 15 AND < 5.0 mg/L)

SEPTEMBER 20, 2022

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## ANALYSIS REPORT

**CUSTOMER NAME** : BANRAI SUGAR INDUSTRY COMPANY LIMITED

**ADDRESS** : 88 MOO 12 THAP LUANG BANG RAI UTHAI THANI 61140

**CONTACT INFORMATION** : TEL : 09 5992 6395 E-mail : Safety@raibai@gmail.com

**SAMPLING SOURCE** : WASTEWATER

**SAMPLE TYPE** : WASTEWATER

**SAMPLING DATE** : OCTOBER 4, 2022

**SAMPLING TIME** : 14:25 HOUR

**SAMPLING METHOD** : GRAB

**SAMPLING BY** : [REDACTED]

**ANALYZED BY** : [REDACTED]

**RECEIVED DATE** : OCTOBER 5, 2022

**ANALYTICAL DATE** : OCTOBER 5-12, 2022

**REPORT NO.** : 2022-U080685

**WORK NO.** : 2022-00023

**ANALYSIS NO.** : T22AT694-0001

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT measured method (Unit 1) T22AT694-0001	DETECTION LIMIT
PH <sup>c</sup>	-	ELECTROMETRIC METHOD AT SITE (SM 4500-H B)	8.1 (35°C)	-
TEMPERATURE <sup>a</sup>	°C	LABORATORY AND FIELD METHODS (SM 2550 B)	35	-
BIOCHEMICAL OXYGEN DEMAND <sup>a</sup>	mg/L	5-DAY BOD TEST, MEMBRANE ELECTRODE METHOD (SM 5210 B AND 4500-O G)	486	2.0
CHEMICAL OXYGEN DEMAND <sup>a</sup>	mg/L	CLOSED REFLUX, COLOURIMETRIC METHOD (SM 5220 D)	794	25.0
TOTAL DISSOLVED SOLIDS <sup>a</sup>	mg/L	DRIED AT 180 °C (SM 2540 C)	3,313	25
TOTAL KJELDAHL NITROGEN <sup>a</sup>	mg/L	DIGESTION, DISTILLATION, TITRIMETRIC METHOD (SM 4800-NH3 C)	15.0	15
FAT, OIL AND GREASE <sup>a</sup>	mg/L	LIQUID-LIQUID, PARTITION-GRAVIMETRIC METHOD (SM 5520 B)	ND	3
<b>SAMPLE CONDITION</b> WATER'S COLOUR/TURBID SEDIMENT			BROWN/TURBID BROWN	

<sup>a</sup> : ISO/IEC 17025 ACCREDITED BY THAI INDUSTRIAL STANDARDS INSTITUTE (TISI)

<sup>b</sup> : ISO/IEC 17025 ACCREDITED BY DEPARTMENT OF SCIENCE SERVICE (DSS)

<sup>c</sup> : VERIFIED BY OWN LABORATORY QUALITY SYSTEM, BUT STILL NOT ACCREDITED

SM : STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 23<sup>rd</sup> EDITION, 2017.

ND : NON-DETECTABLE

OCTOBER 19, 2022

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## ANALYSIS REPORT

**CUSTOMER NAME** : BANRAI SUGAR INDUSTRY COMPANY LIMITED

**ADDRESS** : 88 MOO 12 THAP LUANG BANG RAI UTHAI THANI 61140

**CONTACT INFORMATION** : TEL : 09 5992 6395 E-mail : Safety@raibai@gmail.com

**SAMPLING SOURCE** : WASTEWATER

**SAMPLE TYPE** : WASTEWATER

**SAMPLING DATE** : OCTOBER 4, 2022

**SAMPLING TIME** : 14:00 HOUR

**SAMPLING METHOD** : GRAB

**SAMPLING BY** : [REDACTED]

**ANALYZED BY** : [REDACTED]

**RECEIVED DATE** : OCTOBER 5, 2022

**ANALYTICAL DATE** : OCTOBER 5-12, 2022

**REPORT NO.** : 2022-U080686

**WORK NO.** : 2022-00023

**ANALYSIS NO.** : T22AT694-0002

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT measured method T22AT694-0002	REGULATORY STANDARD	DETECTION LIMIT
PH <sup>c</sup>	-	ELECTROMETRIC METHOD AT SITE (SM 4500-H B)	8.8 (31°C)	5.5-9.0	-
TEMPERATURE <sup>a</sup>	°C	LABORATORY AND FIELD METHODS (SM 2550 B)	31	≤ 40	-
BIOCHEMICAL OXYGEN DEMAND <sup>a</sup>	mg/L	5-DAY BOD TEST, MEMBRANE ELECTRODE METHOD (SM 5210 B AND 4500-O G)	6.4	≤ 20	2.0
CHEMICAL OXYGEN DEMAND <sup>a</sup>	mg/L	CLOSED REFLUX, COLOURIMETRIC METHOD (SM 5220 D)	39.6	≤ 100	25.0
TOTAL DISSOLVED SOLIDS <sup>a</sup>	mg/L	DRIED AT 180 °C (SM 2540 C)	897	≤ 3,000	25
TOTAL KJELDAHL NITROGEN <sup>a</sup>	mg/L	DIGESTION, DISTILLATION, TITRIMETRIC METHOD (SM 4800-NH3 C)	< LOQ	≤ 100	15
FAT, OIL AND GREASE <sup>a</sup>	mg/L	LIQUID-LIQUID, PARTITION-GRAVIMETRIC METHOD (SM 5520 B)	ND	≤ 5	3
<b>SAMPLE CONDITION</b> WATER'S COLOUR/TURBID SEDIMENT			YELLOW/TURBID YELLOW		

<sup>a</sup> : ISO/IEC 17025 ACCREDITED BY THAI INDUSTRIAL STANDARDS INSTITUTE (TISI)

<sup>b</sup> : ISO/IEC 17025 ACCREDITED BY DEPARTMENT OF SCIENCE SERVICE (DSS)

<sup>c</sup> : VERIFIED BY OWN LABORATORY QUALITY SYSTEM, BUT STILL NOT ACCREDITED

SM : STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 23<sup>rd</sup> EDITION, 2017.

REGULATORY STANDARD : INDUSTRIAL EFFLUENT STANDARDS, NOTIFICATION OF THE MINISTRY OF INDUSTRY, I.E. 2800.

PUBLISHED IN THE ROYAL GOVERNMENT GAZETTE, VOL. 94, PART 63 D, DATED JUNE 7 2017.

ND : NON-DETECTABLE

< LOQ : < LIMIT OF QUANTITATION (TOTAL KJELDAHL NITROGEN ≥ 15 AND < 50 mg/L).

OCTOBER 19, 2022

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## ANALYSIS REPORT

**CUSTOMER NAME** : BANRAI SUGAR INDUSTRY COMPANY LIMITED  
**ADDRESS** : 88 MOO 12 THAP LUANG BAN RAI UTHAI THANI 61140  
**CONTACT INFORMATION** : TEL : 09 5982 6395 e-mail : Safety@bsei.com

**SAMPLING SOURCE** : WASTEWATER  
**SAMPLE TYPE** : WASTEWATER  
**SAMPLING DATE** : NOVEMBER 1, 2022  
**SAMPLING TIME** : 14:25 HOUR  
**SAMPLING METHOD** : GRAB  
**SAMPLING BY** : [REDACTED]  
**ANALYZED BY** : [REDACTED]

**RECEIVED DATE** : NOVEMBER 2, 2022  
**ANALYTICAL DATE** : NOVEMBER 2-9, 2022  
**REPORT NO.** : 2022-006010  
**WORK NO.** : 2022-000023  
**ANALYSIS NO.** : T22AV680-0001

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	DETECTION LIMIT
pH <sup>a</sup>	-	ELECTROMETRIC METHOD AT SITE (SM 4500-H <sup>+</sup> B)	6.5 (34°C)	-
TEMPERATURE <sup>c</sup>	°C	LABORATORY AND FIELD METHODS (SM 2550 B)	34	-
BIOCHEMICAL OXYGEN DEMAND <sup>a</sup>	mg/L	5-DAY 800 TEST, MEMBRANE ELECTRODE METHOD (SM 5210 B AND 4800-O G)	149	2.0
CHEMICAL OXYGEN DEMAND <sup>a</sup>	mg/L	CLOSED REFLEX, COLOURIMETRIC METHOD (SM 5220 D)	459	25.0
TOTAL DISSOLVED SOLIDS <sup>b</sup>	mg/L	DRIED AT 180 °C (SM 2540 C)	3,291	25
TOTAL KJELDAHL NITROGEN <sup>a</sup>	mg/L	DIGESTION, DISTILLATION, TITRIMETRIC METHOD (SM 4500-NH <sub>3</sub> C)	218	15
FAT, OIL AND GREASE <sup>a</sup>	mg/L	LIQUID-LIQUID, PARTITION-GRAVIMETRIC METHOD (SM 5520 B)	4	3
<b>SAMPLE CONDITION</b> WATER'S COLOUR/TURBID SEDIMENT			BROWN/TURBID GREEN	

<sup>a</sup> : ISO/IEC 17025 ACCREDITED BY THAI INDUSTRIAL STANDARDS INSTITUTE (TISI)

<sup>b</sup> : ISO/IEC 17025 ACCREDITED BY DEPARTMENT OF SCIENCE SERVICE (DSS)

<sup>c</sup> : VERIFIED BY OWN LABORATORY QUALITY SYSTEM, BUT STILL NOT ACCREDITED

SM : STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 23<sup>RD</sup> EDITION, 2017.

NOVEMBER 14, 2022

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NO SCALE CARRIED  
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## ANALYSIS REPORT

**CUSTOMER NAME** : BANRAI SUGAR INDUSTRY COMPANY LIMITED  
**ADDRESS** : 88 MOO 12 THAP LUANG BAN RAI UTHAI THANI 61140  
**CONTACT INFORMATION** : TEL : 09 5982 6395 e-mail : Safety@bsei.com

**SAMPLING SOURCE** : WASTEWATER  
**SAMPLE TYPE** : WASTEWATER  
**SAMPLING DATE** : NOVEMBER 1, 2022  
**SAMPLING TIME** : 14:45 HOUR  
**SAMPLING METHOD** : GRAB  
**SAMPLING BY** : [REDACTED]  
**ANALYZED BY** : [REDACTED]

**RECEIVED DATE** : NOVEMBER 2, 2022  
**ANALYTICAL DATE** : NOVEMBER 2-9, 2022  
**REPORT NO.** : 2022-006012  
**WORK NO.** : 2022-000023  
**ANALYSIS NO.** : T22AV680-0002

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT
pH <sup>a</sup>	-	ELECTROMETRIC METHOD AT SITE (SM 4500-H <sup>+</sup> B)	6.7 (30°C)	5.5-9.0	-
TEMPERATURE <sup>c</sup>	°C	LABORATORY AND FIELD METHODS (SM 2550 B)	30	≤ 40	-
BIOCHEMICAL OXYGEN DEMAND <sup>a</sup>	mg/L	5-DAY 800 TEST, MEMBRANE ELECTRODE METHOD (SM 5210 B AND 4800-O G)	52	≤ 20	2.0
CHEMICAL OXYGEN DEMAND <sup>a</sup>	mg/L	CLOSED REFLEX, COLOURIMETRIC METHOD (SM 5220 D)	352	≤ 120	25.0
TOTAL DISSOLVED SOLIDS <sup>b</sup>	mg/L	DRIED AT 180 °C (SM 2540 C)	664	≤ 3,000	25
TOTAL KJELDAHL NITROGEN <sup>a</sup>	mg/L	DIGESTION, DISTILLATION, TITRIMETRIC METHOD (SM 4500-NH <sub>3</sub> C)	< LOQ	≤ 100	15
FAT, OIL AND GREASE <sup>a</sup>	mg/L	LIQUID-LIQUID, PARTITION-GRAVIMETRIC METHOD (SM 5520 B)	ND	≤ 5	3
<b>SAMPLE CONDITION</b> WATER'S COLOUR/TURBID SEDIMENT			YELLOW/TURBID GREEN		

<sup>a</sup> : ISO/IEC 17025 ACCREDITED BY THAI INDUSTRIAL STANDARDS INSTITUTE (TISI)

<sup>b</sup> : ISO/IEC 17025 ACCREDITED BY DEPARTMENT OF SCIENCE SERVICE (DSS)

<sup>c</sup> : VERIFIED BY OWN LABORATORY QUALITY SYSTEM, BUT STILL NOT ACCREDITED

SM : STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 23<sup>RD</sup> EDITION, 2017.

REGULATORY STANDARD : INDUSTRIAL EFFLUENT STANDARDS, NOTIFICATION OF THE MINISTRY OF INDUSTRY, B.E. 2550,

PUBLISHED IN THE ROYAL GOVERNMENT GAZETTE, VOL. 104, PART 163 D, DATED JUNE 7, 2017.

ND : NON-DETECTABLE

< LOQ : < LIMIT OF QUANTIFICATION (TOTAL KJELDAHL NITROGEN ≥ 15 AND < 5.0 mg/L)

NOVEMBER 14, 2022

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## ANALYSIS REPORT

**CUSTOMER NAME** : BANHAI SUGAR INDUSTRY COMPANY LIMITED

**ADDRESS** : 88 MOO 12 THAP LUANG BAN RAI UTHAI THANI 61140

**CONTACT INFORMATION** : TEL : 09 5942 6395 E-mail : Safety@bhai.com

**SAMPLING SOURCE** : WASTEWATER

**SAMPLE TYPE** : WASTEWATER

**SAMPLING DATE** : DECEMBER 6, 2022

**SAMPLING TIME** : 14:05 HOUR

**SAMPLING METHOD** : GRAB

**SAMPLING BY** : [REDACTED]

**ANALYZED BY** : [REDACTED]

**RECEIVED DATE** : DECEMBER 7, 2022

**ANALYTICAL DATE** : DECEMBER 7-15, 2022

**REPORT NO.** : 2022-UJ00116

**WORK NO.** : 2022-00023

**ANALYSIS NO.** : T22AY331-0001

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT [REDACTED]	DETECTION LIMIT
pH <sup>a</sup>	-	ELECTROMETRIC METHOD AT SITE (SM 4500-H B)	9.0 (37°C)	-
TEMPERATURE <sup>c</sup>	°C	LABORATORY AND FIELD METHODS (SM 2540 B)	31	-
BIOCHEMICAL OXYGEN DEMAND <sup>a</sup>	mg/L	5-DAY BOD TEST, MEMBRANE ELECTRODE METHOD (SM 5210 B AND 4500-O G)	389	2.0
CHEMICAL OXYGEN DEMAND <sup>a</sup>	mg/L	CLOSED REFLEX, COLOURIMETRIC METHOD (SM 5220 D)	679	25.0
TOTAL DISSOLVED SOLIDS <sup>b</sup>	mg/L	DRIED AT 180 °C (SM 2540 C)	3,080	25
TOTAL KJELDAHL NITROGEN <sup>c</sup>	mg/L	DIGESTION, DISTILLATION, TITRIMETRIC METHOD (SM 4500-Norg C)	90.2	15
FAT, OIL AND GREASE <sup>a</sup>	mg/L	LIQUID-LIQUID, PARTITION-GRAVIMETRIC METHOD (SM 5620 B)	ND	3
<b>SAMPLE CONDITION</b> WATER'S COLOUR/TURBID SEDIMENT			YELLOW/TURBID BROWN	

<sup>a</sup> : ISO/IEC 17025 ACCREDITED BY THAI INDUSTRIAL STANDARDS INSTITUTE (TISI)

<sup>b</sup> : ISO/IEC 17025 ACCREDITED BY DEPARTMENT OF SCIENCE SERVICE (DSS)

<sup>c</sup> : VERIFIED BY OWN LABORATORY QUALITY SYSTEM, BUT STILL NOT ACCREDITED

SM : STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 23<sup>rd</sup> EDITION, 2017.

ND : NON-DETECTABLE

DECEMBER 20, 2022

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United Analyst and Engineering Consultant Co., Ltd.  
35a Udomsak 41, Sukhumvit Road, Bangkok, Phrakhanong, Bangkok 10260  
Tel: 02763 2828 Fax: 02763 2800 www.uaecconsultant.com E-mail: uaec@uaecconsultant.com

### ANALYSIS REPORT

CUSTOMER NAME : BANRAI ELECTRICITY GENERATING COMPANY LIMITED  
ADDRESS : 101 MOO 12 THAP LUANG BAN RAI UTHAI THANI 61140  
CONTACT INFORMATION : TEL : 09 5992 6395 e-mail : Safetythanasak@hotmail.com  
SAMPLING SOURCE : -  
SAMPLE TYPE : FLY ASH  
SAMPLING DATE : DECEMBER 6, 2022  
SAMPLING TIME : 14:30 HOUR  
SAMPLING METHOD : G948  
SAMPLING BY :  
ANALYZED BY :  
RECEIVED DATE : DECEMBER 7, 2022  
ANALYTICAL DATE : DECEMBER 7-16, 2022  
REPORT NO. : 2022-U102866  
WORK NO. : 2022-005151  
ANALYSIS NO. : T22AY333-0001

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT FLY ASH T22AY333-0001	REGULATORY STANDARD	DETECTION LIMIT
pH (1:1)	-	ELECTROMETRIC METHOD (US EPA 2004 9045D)	8.0 (25°C)	-	-
ELECTRICAL CONDUCTIVITY (1%)	dS/m	ELECTRICAL CONDUCTIVITY METHOD	2.34 (25°C)	-	-
MOISTURE	%	ASTM D2874 - 14	310	-	-
ORGANIC CARBON	% w/w	WALKLEY AND BLACK 1947 AND CALCULATION METHOD	2.33	-	-
NITROGEN	% w/w	AOAC OFFICIAL METHOD 966.04	0.068	-	0.05
TOTAL PHOSPHATE	% w/w P <sub>2</sub> O <sub>5</sub>	AOAC OFFICIAL METHOD 966.01	0.67	-	0.61
POTASH	% w/w	AOAC OFFICIAL METHOD 971.01	0.387	-	0.001
TOTAL RATIO	-	CALCULATION	179.1	-	-
TOTAL THRESHOLD LIMIT CONCENTRATION (TL)					
ARSENIC (As)	mg/kg (wet weight)	ACID DIGESTION AND HYDRIDE GENERATION AAS METHOD (US EPA 896: 3050B AND 7602-7001A)	6.13	< 500	0.100
MERCURY (Hg)	mg/kg (wet weight)	ACID DIGESTION AND COLD VAPOR AAS METHOD (US EPA 2007: 7471B)	ND	< 20	0.100
CADMIUM (Cd)	mg/kg (wet weight)	ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD (US EPA 2006: 3050B AND 2007: 7000B)	ND	< 900	0.300
LEAD (Pb)	mg/kg (wet weight)	ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD (US EPA 896: 3050B AND 2007: 7000B)	8.92	< 1,000	1.550
SAMPLE CONDITION			BLACK ASH		

REGULATORY STANDARD : DISPOSAL OF SOLID WASTE OR UNUSABLE MATERIAL, NOTIFICATION OF THE MINISTRY OF INDUSTRY (B.E.2548).

APPENDIX 2, ITEM 5.1

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NO SAMPLE RETURNED  
BY MR. SUKUM (N/AJANG) CLT.

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ภาคผนวก ข-3

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เอกสารขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน



ที่ เอก ๐๓๑๐(๑)/ ๑๘๗ ๙

กรมโรงงานอุตสาหกรรม  
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท  
เขตราชเทวี กรุงเทพฯ ๑๐๕๐๐

๐ ๙ กุมภาพันธ์ ๒๕๖๕

เรื่อง ค่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์โรคระบาด

เรียน กรรมการผู้จัดการ บริษัท ยูไนเต็ด แอนนาลิสต์ แอนด์ เอ็นจิเนียริง คอนซัลแตนท์ จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารเคมีของห้องปฏิบัติการวิเคราะห์โรคระบาด  
ลงวันที่ ๒๗ ธันวาคม ๒๕๖๔

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

ตามหนังสือที่อ้างถึง บริษัท ยูไนเต็ด แอนนาลิสต์ แอนด์ เอ็นจิเนียริง คอนซัลแตนท์ จำกัด ขอต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์โรคระบาด เลขทะเบียน ๖-๑๔๕ สถานที่ตั้งเลขที่ ๓ ซอยอุดมสุข ๔๑ ถนนสุขุมวิท แขวงบางจาก เขตพระโขนง กรุงเทพมหานคร ต่อกรมโรงงานอุตสาหกรรม นั้น

- กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้บริษัท ยูไนเต็ด แอนนาลิสต์ แอนด์ เอ็นจิเนียริง คอนซัลแตนท์ จำกัด ค่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์โรคระบาด โดยเมืองประกอบดังมี
- ก. ผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์ จำนวน ๔๐ ราย ตามสิ่งที่ส่งมาด้วย ๑
  - ข. เจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๑๐๖ ราย ตามสิ่งที่ส่งมาด้วย ๒
  - ค. ขอบข่ายสารเคมีที่ได้รับขึ้นทะเบียนไว้วิเคราะห์ในน้ำเสีย น้ำใต้ดิน อากาศเสีย สิ่งปฏิกูล หรือวัสดุที่ไม่ได้แล้ว และดิน ตามสิ่งที่ส่งมาด้วย ๓

หนังสือฉบับนี้จะหมดอายุในวันที่ ๒ กุมภาพันธ์ ๒๕๖๕ หากประสงค์จะต่ออายุหนังสือ รับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์โรคระบาด ขอเชิญ ให้ยื่นคำขอต่ออายุพร้อมเอกสารประกอบคำขอต่อ กรมโรงงานอุตสาหกรรมภายใน ๓๐ วัน ก่อนวันสิ้นสุดอายุของหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์โรคระบาด ทั้งนี้ สามารถยื่นคำขอผ่านระบบอิเล็กทรอนิกส์ได้ที่หน้าเว็บไซต์กรมโรงงานอุตสาหกรรม ตาม QR Code ที่แนบมา

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ



ผู้แทนสหภาพจรรยาบรรณวิชาชีพเคมีแห่งประเทศไทย  
มูลนิธิสหภาพเคมีพิทักษ์สิ่งแวดล้อมแห่งประเทศไทย

ยื่นคำขอผ่านระบบอิเล็กทรอนิกส์

กองวิจัยและพัฒนาเภสัชภัณฑ์

กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบผลิตภัณฑ์และทะเบียนห้องปฏิบัติการ

โทร. ๐ ๒๕๓๐ ๖๓๓๒ ต่อ ๒๑๐๓-๕

โทรสาร ๐ ๒๕๓๐ ๖๓๑๒ ต่อ ๒๑๘๙

เว็บไซต์อิเล็กทรอนิกส์ sarakabadi@gmail.com

สิ่งที่ส่งมาด้วย ๑

เอกสารแนบท้ายหนังสือรับต่ออายุขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์โรคระบาด  
บริษัท ยูไนเต็ด แอนนาลิสต์ แอนด์ เอ็นจิเนียริง คอนซัลแตนท์ จำกัด เลขทะเบียน ๖-๑๔๕  
ที่ เอก ๐๓๑๐(๑)/ ๑๘๗ ๙ ลงวันที่ ๐ ๙ กุมภาพันธ์ ๒๕๖๕

ก. ผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์ จำนวน ๔๐ ราย

๑)	ทะเบียนเลข	
๒)	ทะเบียนเลข	
๓)	ทะเบียนเลข	
๔)	ทะเบียนเลข	
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๓๑)	ทะเบียนเลข	
๓๒)	ทะเบียนเลข	
๓๓)	ทะเบียนเลข	
๓๔)	ทะเบียนเลข	
๓๕)	ทะเบียนเลข	

ผู้แทนสหภาพจรรยาบรรณวิชาชีพเคมีแห่งประเทศไทย

๓๖)







เอกสารแนบท้ายหนังสือรับต่ออายุขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน  
บริษัท ยูโนเค็ค แอนนาลิสต์ แอนด์ เอ็นจิเนียริ่ง คอนซัลแตนท์ จำกัด เลขทะเบียน ๖-๑๔๕๕  
ที่ อก ๐๓๑๐(๑)/ ๑๘๗ ๕ ลงวันที่ ๐๙ กุมภาพันธ์ ๒๕๖๕

ขอขยายสารเคมีที่ได้รับขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๑๕๗ รายการ

น้ำเสีย จำนวน 46 รายการ

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

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

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

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

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

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

ลำดับ	สารมลพิษ	วิธีวิเคราะห์
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> 1) Digestion, Direct Air-Acetylene Flame Method <sup>(4)</sup> 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method <sup>(4)</sup>
33	Chromium	3) Digestion, Inductively Coupled Plasma Method <sup>(4)</sup> 1) Digestion, Direct Air-Acetylene Flame Method; Colorimetric Method; Calculation <sup>(4)</sup> 2) Digestion, Inductively Coupled Plasma Method; Colorimetric Method; Calculation <sup>(4)</sup> 1) Colorimetric Method <sup>(4)</sup> 2) Extraction, Air-Acetylene Flame Method <sup>(4)</sup>
34	Chromium (III)	1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(4)</sup>
35	Chromium (VI)	2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(4)</sup> Distillation, Colorimetric Method <sup>(4)</sup>
36	Chrysene	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(4)</sup> 1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(4)</sup> 2) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(4)</sup>
37	Cyanide	1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(4)</sup>
38	2,4-D	2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(4)</sup>
39	DDD	1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(4)</sup> 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(4)</sup>
40	DDE	1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(4)</sup> 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(4)</sup>
41	DDT	1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(4)</sup> 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(4)</sup>

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

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

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

ลำดับ	สารพิษ	วิธีวิเคราะห์
82	Manganese	1) Digestion, Direct Air-Acetylene Flame Method <sup>(4)</sup> 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method <sup>(4)</sup> 3) Digestion, Inductively Coupled Plasma Method <sup>(4)</sup>
83	Mercury	Digestion, Cold-Vapor Atomic Absorption Spectrometric Method <sup>(4)</sup>
84	Methanol	Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>(4)</sup>
85	Methoxychlor	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(4)</sup>
86	Methyl bromide	Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>(4)</sup>
87	Methylene chloride	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	1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(4)</sup> 2) 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	1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(4)</sup> 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(4)</sup>
92	Nickel	1) Digestion, Direct Air-Acetylene Flame Method <sup>(4)</sup> 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method <sup>(4)</sup> 3) Digestion, Inductively Coupled Plasma 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>

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

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

ลำดับ	สารมลพิษ	วิธีวิเคราะห์
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, Direct Air-Acetylene Flame Method <sup>(4)</sup> 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method <sup>(4)</sup> 3) Digestion, Inductively Coupled Plasma Method <sup>(4)</sup>

**ขนาดเฉลี่ย (ปดองรณน) จำนวน 25 รายการ**

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

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

สิ่งปฏิกูลหรือวัสดุที่ไม่ใช้แล้ว จำนวน 3.5 รายการ

ลำดับ	สารเคมี	วิธีวิเคราะห์
1	Aldrin	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(2.9.22)</sup> 2) Ultrasonic Extraction, Gas Chromatographic Method <sup>(10.22)</sup> Digestion, Inductively Coupled Plasma Method <sup>(7.13)</sup>
2	Antimony	1) Waste Extraction, Digestion, Hydride Generation/Atomic Absorption Spectrometric Method <sup>(2.6.13)</sup>
3	Arsenic	2) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>(2.6.13)</sup> 3) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method <sup>(7.13)</sup>
4	Barium	4) Digestion, Inductively Coupled Plasma Method <sup>(7.13)</sup> 1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>(2.6.13)</sup>
5	Beryllium	2) Digestion, Inductively Coupled Plasma Method <sup>(7.13)</sup> 1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>(2.6.13)</sup>
6	Cadmium	2) Digestion, Inductively Coupled Plasma Method <sup>(7.13)</sup> 1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method <sup>(2.6.14)</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>(2.6.13)</sup>
7	Chlordane	3) Digestion, Flame Atomic Absorption Spectrometric Method <sup>(7.14)</sup> 4) Digestion, Inductively Coupled Plasma Method <sup>(7.13)</sup> 1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(2.9.22)</sup> 2) Ultrasonic Extraction, Gas Chromatographic Method <sup>(10.22)</sup>
8	Chromium	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method <sup>(2.6.14)</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>(2.6.13)</sup>

ลำดับ	สารเคมี	วิธีวิเคราะห์
9	Chromium (III)	3) Digestion, Flame Atomic Absorption Spectrometric Method <sup>(7.14)</sup> 4) Digestion, Inductively Coupled Plasma Method <sup>(7.13)</sup> 1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method; Waste Extraction, Colorimetric Method; Calculation <sup>(2.6.14,16)</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma Method; Waste Extraction, Colorimetric Method; Calculation <sup>(2.6.13,16)</sup> 3) Digestion, Flame Atomic Absorption Spectrometric Method; Alkaline Digestion, Colorimetric Method; Calculation <sup>(7.14,16)</sup> 4) Digestion, Inductively Coupled Plasma Method; Alkaline Digestion, Colorimetric Method; Calculation <sup>(7.13,16)</sup>
10	Chromium (VI)	1) Waste Extraction, Colorimetric Method <sup>(2.6)</sup> 2) Alkaline Digestion, Colorimetric Method <sup>(8.16)</sup>
11	Cobalt	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>(2.6.13)</sup>
12	Copper	2) Digestion, Inductively Coupled Plasma Method <sup>(7.13)</sup> 1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method <sup>(2.6.14)</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>(2.6.13)</sup> 3) Digestion, Flame Atomic Absorption Spectrometric Method <sup>(7.14)</sup> 4) Digestion, Inductively Coupled Plasma Method <sup>(7.13)</sup> 1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(2.9.22)</sup> 2) Ultrasonic Extraction, Gas Chromatographic Method <sup>(10.22)</sup>
13	2,4-D	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(2.9.22)</sup> 2) Ultrasonic Extraction, Gas Chromatographic Method <sup>(10.22)</sup>
14	DDD	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(2.9.22)</sup> 2) Ultrasonic Extraction, Gas Chromatographic Method <sup>(10.22)</sup>



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

3) Digestion,...

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

- 2,2',4,5,5'...

ลำดับ	สารเคมี	วิธีวิเคราะห์
27	- 2,2',4,4',5,5'- Pentachlorobiphenyl - 2,3,3',4',6- Pentachlorobiphenyl - 2,2',3,4,4',5'- Hexachlorobiphenyl - 2,2',3,4,5,5'- Hexachlorobiphenyl - 2,2',3,5,5',6- Hexachlorobiphenyl - 2,2',4,4',5,5'- Hexachlorobiphenyl - 2,2',3,3',4,4',5- Heptachlorobiphenyl - 2,2',3,4,4',5,5'- Heptachlorobiphenyl - 2,2',3,4,4',5',6- Heptachlorobiphenyl - 2,2',3,4',5,5',6- Heptachlorobiphenyl - 2,2',3,3',4,4',5,5',6- Nonachlorobiphenyl Pentachlorophenol	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(2,9,20)</sup> 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(30,20)</sup> Electrometric Method <sup>(31,32)</sup> 1) Waste Extraction, Digestion, Hydride Generation/Atomic Absorption Spectrometric Method <sup>(24,20)</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>(2,6,13)</sup> 3) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method <sup>(7,20)</sup> 4) Digestion, Inductively Coupled Plasma Method <sup>(7,1)</sup>
28	pH	
29	Selenium	

ลำดับ	สารเคมี	วิธีวิเคราะห์
30	Silver	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>(2,6,13)</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>(7,13)</sup>
31	Thallium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>(2,6,13)</sup>
32	Toxaphene	2) Digestion, Inductively Coupled Plasma Method <sup>(7,13)</sup> 1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(2,3,22)</sup> 2) Ultrasonic Extraction, Gas Chromatographic Method <sup>(10,22)</sup>
33	Trichloroethylene	1) Waste Extraction, Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(2,12,23)</sup> 2) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(12,23)</sup>
34	Vanadium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>(2,6,13)</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>(7,13)</sup>
35	Zinc	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method <sup>(2,6,14)</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>(2,6,13)</sup> 3) Digestion, Flame Atomic Absorption Spectrometric Method <sup>(7,14)</sup> 4) Digestion, Inductively Coupled Plasma Method <sup>(7,13)</sup>

## ดิน จำนวน 125 รายการ

ลำดับ	สารเคมี	วิธีวิเคราะห์
1	Acenaphthene	1) Ultrasonic Extraction, Gas Chromatographic Method <sup>(10,24)</sup> 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,23)</sup>
2	Acetone	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(12,23)</sup>

ลำดับ	สารเคมี	วิธีวิเคราะห์
3	Aldrin	1) Ultrasonic Extraction, Gas Chromatographic Method <sup>(10,22)</sup> 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,26)</sup>
4	Anthracene	1) Ultrasonic Extraction, Gas Chromatographic Method <sup>(10,26)</sup> 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,26)</sup>
5	Antimony	Digestion, Inductively Coupled Plasma Method <sup>(7,13)</sup>
6	Arsenic	1) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method <sup>(7,15)</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>(7,13)</sup>
7	Atrazine	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,26)</sup>
8	Barium	Digestion, Inductively Coupled Plasma Method <sup>(7,13)</sup>
9	Benz(a)anthracene	1) Ultrasonic Extraction, Gas Chromatographic Method <sup>(10,26)</sup> 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,26)</sup>
10	Benzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(12,25)</sup>
11	Benzo(b)fluoranthene	1) Ultrasonic Extraction, Gas Chromatographic Method <sup>(10,26)</sup> 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,26)</sup>
12	Benzo(k)fluoranthene	1) Ultrasonic Extraction, Gas Chromatographic Method <sup>(10,26)</sup> 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,26)</sup>
13	Benzoic acid	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,26)</sup>
14	Benzo(a)pyrene	1) Ultrasonic Extraction, Gas Chromatographic Method <sup>(10,26)</sup> 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,26)</sup>

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

ลำดับ	สารเคมี	วิธีวิเคราะห์
31	Chloroform	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(12.25)</sup>
32	2-Chlorophenol	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10.28)</sup>
33	Chromium	1) Digestion, Flame Atomic Absorption Spectrometric Method <sup>(7.14)</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>(7.13)</sup>
34	Chromium (III)	1) Digestion, Flame Atomic Absorption Spectrometric Method; Alkaline Digestion, Colorimetric Method; Calculation <sup>(7.8, 14, 16)</sup> 2) Digestion, Inductively Coupled Plasma Method; Alkaline Digestion, Colorimetric Method; Calculation <sup>(7.8, 13, 16)</sup>
35	Chromium (VI)	Alkaline Digestion, Colorimetric Method <sup>(8.16)</sup>
36	Chrysene	1) Ultrasonic Extraction, Gas Chromatographic Method <sup>(10.24)</sup> 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10.28)</sup>
37	Cyanide	Extraction, Distillation, Colorimetric Method <sup>(20.29, 30)</sup>
38	2,4-D	Ultrasonic Extraction, Gas Chromatographic Method <sup>(27)</sup>
39	DDD	1) Ultrasonic Extraction, Gas Chromatographic Method <sup>(10.22)</sup> 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10.28)</sup>
40	DDE	1) Ultrasonic Extraction, Gas Chromatographic Method <sup>(10.22)</sup> 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10.28)</sup>
41	DOT	1) Ultrasonic Extraction, Gas Chromatographic Method <sup>(10.22)</sup> 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10.28)</sup>
42	Dibenz(a,h)anthracene	1) Ultrasonic Extraction, Gas Chromatographic Method <sup>(10.24)</sup> 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10.28)</sup>

ลำดับ	สารเคมี	วิธีวิเคราะห์
43	Di-n-butyl phthalate	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10.28)</sup>
44	1,2-Dichlorobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(12.25)</sup>
45	1,3-Dichlorobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(12.25)</sup>
46	1,4-Dichlorobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(12.25)</sup>
47	3,3'-Dichlorobenzidine	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10.26)</sup>
48	1,1-Dichloroethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(12.25)</sup>
49	1,2-Dichloroethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(12.25)</sup>
50	1,1-Dichloroethylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(12.25)</sup>
51	cis-1,2-Dichloroethylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(12.25)</sup>
52	trans-1,2-Dichloroethylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(12.25)</sup>
53	2,4-Dichlorophenol	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10.26)</sup>
54	1,2-Dichloropropane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(12.25)</sup>
55	1,3-Dichloropropane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(12.25)</sup>
56	1,3-Dichloropropene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(12.25)</sup>
57	Dieldrin	1) Ultrasonic Extraction, Gas Chromatographic Method <sup>(10.22)</sup> 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10.26)</sup>
58	Diethyl phthalate	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10.26)</sup>
59	2,4-Dimethylphenol	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10.26)</sup>

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

ลำดับ	สารเคมี	วิธีวิเคราะห์
71	Hexachlorobenzene	1) Ultrasonic Extraction, Gas Chromatographic Method <sup>(10,22)</sup> 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,26)</sup>
72	Hexachloro-1,3-butadiene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(12,25)</sup>
73	n-Hexane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(12,25)</sup>
74	$\alpha$ -HCH	1) Ultrasonic Extraction, Gas Chromatographic Method <sup>(10,22)</sup> 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,26)</sup>
75	$\beta$ -HCH	1) Ultrasonic Extraction, Gas Chromatographic Method <sup>(10,22)</sup> 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,26)</sup>
76	$\gamma$ -HCH	1) Ultrasonic Extraction, Gas Chromatographic Method <sup>(10,22)</sup> 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,26)</sup>
77	Hexachlorocyclopentadiene	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,26)</sup>
78	Hexachloroethane	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,26)</sup>
79	Indeno[1,2,3-cd]pyrene	1) Ultrasonic Extraction, Gas Chromatographic Method <sup>(10,26)</sup> 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,26)</sup>
80	Isophorone	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,26)</sup>
81	Lead	1) Digestion, Flame Atomic Absorption Spectrometric Method <sup>(7,14)</sup>
82	Manganese	1) Digestion, Inductively Coupled Plasma Method <sup>(7,13)</sup> 2) Digestion, Flame Atomic Absorption Spectrometric Method <sup>(7,14)</sup>

ลำดับ	สารเคมี	วิธีการตรวจ
83	Mercury	1) Digestion, Cold-Vapor Atomic Absorption Spectrometric Method <sup>(18)</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>(7,13)</sup> 3) Thermal Decomposition Amalgamation and Atomic Absorption Spectrometric Method <sup>(19)</sup>
84	Methanol	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(12,23)</sup>
85	Methoxychlor	1) Ultrasonic Extraction, Gas Chromatographic Method <sup>(10,23)</sup> 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,26)</sup>
86	Methyl bromide	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(12,23)</sup>
87	Methylene chloride	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(12,23)</sup>
88	2-Methylphenol	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,26)</sup>
89	2-Methylnaphthalene	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,26)</sup>
90	Methyl tert-butyl ether	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(12,23)</sup>
91	Naphthalene	1) Ultrasonic Extraction, Gas Chromatographic Method <sup>(10,26)</sup> 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,26)</sup>
92	Nickel	1) Digestion, Flame Atomic Absorption Spectrometric Method <sup>(7,19)</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>(7,13)</sup>
93	Nitrobenzene	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,26)</sup>
94	N-Nitrosodiphenylamine	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,26)</sup>
95	N-Nitrosodipropylamine	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,26)</sup>

96 Polychlorinated Biphenyls...

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

- 2,2',3,4',5,5',6...

ลำดับ	สารเคมี	วิธีวิเคราะห์
	- 2,2',3,4',5,5',6-Heptachlorobiphenyl - 2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup> 1) Ultrasonic Extraction, Gas Chromatographic Method <sup>(10,29)</sup> 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup>
97	Pentachlorophenol	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,29)</sup>
98	Phenanthrene	1) Ultrasonic Extraction, Gas Chromatographic Method <sup>(10,28)</sup> 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup>
99	Phenol	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup>
100	Pyrene	1) Ultrasonic Extraction, Gas Chromatographic Method <sup>(10,29)</sup> 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup>
101	Selenium	1) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method <sup>(7,22)</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>(7,13)</sup>
102	Silver	Digestion, Inductively Coupled Plasma Method <sup>(7,13)</sup>
103	Styrene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(12,25)</sup>
104	1,1,2,2-Tetrachloroethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(12,25)</sup>
105	Tetrachloroethylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(12,25)</sup>
106	Toluene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(12,25)</sup>
107	Toxaphene	Ultrasonic Extraction, Gas Chromatographic Method <sup>(10,29)</sup>
108	TPH (C <sub>5</sub> -C <sub>8</sub> )	1) Purge and Trap, Gas Chromatographic Method <sup>(12,21)</sup> 2) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(12,25)</sup>
109	TPH (C <sub>9</sub> -C <sub>16</sub> )	Ultrasonic Extraction, Gas Chromatographic Method <sup>(10,21)</sup>
110	TPH (C <sub>16</sub> -C <sub>35</sub> )	Ultrasonic Extraction, Gas Chromatographic Method <sup>(10,21)</sup>
111	1,2,4-Trichlorobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(12,25)</sup>

ลำดับ	สารเคมี	วิธีวิเคราะห์
112	1,1,1-Trichloroethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(12,25)</sup>
113	1,1,2-Trichloroethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(12,25)</sup>
114	Trichloroethylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(12,25)</sup>
115	2,4,5-Trichlorophenol	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup>
116	2,4,6-Trichlorophenol	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup>
117	1,3,5-Trimethylbenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(12,25)</sup>
118	Vanadium	Digestion, Inductively Coupled Plasma Method <sup>(7,13)</sup>
119	Vinyl acetate	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(12,25)</sup>
120	Vinyl chloride	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(12,25)</sup>
121	m-Xylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(12,25)</sup>
122	o-Xylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(12,25)</sup>
123	p-Xylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(12,25)</sup>
124	Xylene (Total)	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(12,25)</sup>
125	Zinc	1) Digestion, Flame Atomic Absorption Spectrometric Method <sup>(7,14)</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>(7,13)</sup>

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# List of Instruments Certification for Air & Noise Quality Analysis

No.	Instrument/Equipment	Parameter	Manufacturer	Model/Serial No.	Calibrator	Certification No.	Date of Calibration	Due date of Calibration	Remark
1	Pre-Test Console	Total Suspended Particulate Copper Total Hydrocarbons	Apex Instruments, USA.	XC-S72-V 0807048	Envr Equipment Service Co. Ltd.	E21-0821	2 Sep 21	1 Sep 22	-
2	Flue gas Analyzer	Sulphur Dioxide Oxide of Nitrogen as Nitrogen Dioxide Carbon Monoxide	Testo	Testo 350 60899456	Entech Industrial Solution Co., Ltd.	G 640441	5 Aug 21	4 Aug 22	-

No.	Instrument/Equipment	Parameter	Manufacturer	Model/Serial No.	Calibrator	Certification No.	Date of Calibration	Due date of Calibration	Remark
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## Ambient

1	Office Transfer Standard	Total Suspended Particulate (TSP) Particulate Matter < 10 µm (PM <sub>10</sub> )	Tsch Environmental Inc.	TE-5025A 3383	Tisch Environmental Inc.	Z7072020	27 Jul 20	26 Jul 22	-
2	U-Tube Manometer	Total Suspended Particulate (TSP) Particulate Matter < 10 µm (PM <sub>10</sub> )	Dwyer	1221-36-W/M 3383	Technology Promotion Association (Thailand-Japan)	22P800	12 Mar 22	11 Mar 23	-
3	Anemoid Barometer	Total Suspended Particulate (TSP) Particulate Matter < 10 µm (PM <sub>10</sub> )	Barigo, Germany	-	Technology Promotion Association (Thailand-Japan)	21P2500	21 Jul 21	20 Jul 22	-
4	Dual Thermo-Hygrometer	Total Suspended Particulate (TSP) Particulate Matter < 10 µm (PM <sub>10</sub> )	Barigo, Germany	-	Technology Promotion Association (Thailand-Japan)	22H771	5 Apr 22	4 Apr 23	-
5	Nitrogen Dioxide Analyzer	Nitrogen Dioxide	Thermo Scientific	42i 1201778108	UAE Consultant Co.,Ltd.	08122021	8 Dec 21	7 Dec 22	-
6	Nitrogen Dioxide Analyzer	Nitrogen Dioxide	Thermo Scientific	42i 1201778109	UAE Consultant Co.,Ltd.	08122021	8 Dec 21	7 Dec 22	-
7	Nitrogen Dioxide Analyzer	Nitrogen Dioxide	Thermo Scientific	42i 1201778105	UAE Consultant Co.,Ltd.	17112021	17 Nov 21	16 Nov 22	-
8	Standard Gases (Mixture)	Nitrogen Dioxide	Airgas	CC159599 2015P5K5	Airgas an Air Liquide company	E04M99E15A010C	30 Jul 19	30 Jul 22	-
9	Carbon Monoxide Analyzer	Carbon Monoxide	Thermo	48i 1201497730	UAE Consultant Co.,Ltd.	30112021	30 Nov 21	29 Nov 22	-
10	Carbon Monoxide Analyzer	Carbon Monoxide	Thermo	48i 1201497732	UAE Consultant Co.,Ltd.	30112021	30 Nov 21	29 Nov 22	-
11	Carbon Monoxide Analyzer	Carbon Monoxide	Thermo	48i 1201497733	UAE Consultant Co.,Ltd.	30112021	30 Nov 21	29 Nov 22	-
12	Standard Gases (Mixture)	Carbon Monoxide	Airgas	CC159599 2015P5K5	Airgas an Air Liquide company	160-401526192-1	30 Jul 19	30 Jul 22	-

# List of Instruments Certification for Air & Noise Quality Analysis

List of Instruments Certification for Air & Noise Quality Analysis

No.	Instrument/Equipment	Parameter	Manufacturer	Model/Serial No.	Calibrator	Certification No.	Date of Calibration	Due date of Calibration	Remark
Ambient									
13	Wind Speed/Wind Direction	WS/WD	LSI LASTEM	E-UC305	Thai Meteorological Department	385/21	16 Aug 21	16 Aug 22	-
14	Sound Level Calibrator (Acoustic Calibrator)	Calibrate Sound Level Meter	Larson Davis	CA150	Innovative Instrument Co.,Ltd	21-ACT-1327	28 Aug 21	23 Aug 22	-
15	Sound Level Meter	Long 20 mV 120V 120V 120V	Larson Davis	LT12	Sithiporn Associates Co., Ltd.	ACL22081	25 Jan 22	24 Jan 23	-
16	Sound Level Meter	Long 20 mV 120V 120V 120V	Larson Davis	LT12	Innovative Instrument Co.,Ltd	22-ACT-034	21 Jan 22	20 Jan 23	-
17	Sound Level Meter	Long 20 mV 120V 120V 120V	Larson Davis	LT12	Sithiporn Associates Co., Ltd.	ACL22081	25 Jan 22	24 Jan 23	-
18	Sound Level Meter	Long 20 mV 120V 120V 120V	Larson Davis	LT12	Innovative Instrument Co.,Ltd	22-ACT-104	11 Feb 22	10 Feb 23	-
19	Sound Level Meter	Long 20 mV 120V 120V 120V	Larson Davis	LT12	Innovative Instrument Co.,Ltd	22-ACT-105	11 Feb 22	10 Feb 23	-

List of Instruments Certification for Water Quality Analysis

No.	Instrument/Equipment	Parameter	Manufacturer	Model/Serial No.	Calibrator	Certification No.	Date of Calibration	Due date of Calibration	Remark
Water									
1	pH Meter	pH	Horiba	LAQUA-PH210	Technology Promotion Association (Thailand-Japan)	21CHI-607	19 Nov 21	18 Nov 22	-

Envi Equipment Service Co., Ltd.  
110/254 Moo 3, Tambon Bang Rak Phatthana, Amphur Bang Bua Thong, Nonthaburi 11110  
Tel. 098 362 9152, 089 478 7885  
E-mail: sales@envi-eess.com

Certificate No. : EE21-0821  
Page : 1 of 6

## CERTIFICATE OF CALIBRATION

Customer : United Analyst and Engineering Consultant Co., Ltd.  
Address : 81 Soi Udomsuk 41, Sukhumvit Road, Bangchak, Phrahanong, Bangkok 10260  
Description of Equipment : Console meter  
Manufacturer : Apex Instrument  
Model Number : XC-572-V  
Serial Number : 0807048  
ID/Control No. :  
Environment Conditions : Temperature (25 ± 2) °C  
Humidity (50 ± 15) % RH  
Cal. Date : 02/09/2021  
Issue Date : 02/09/2021

### Calibration Method or Calibration Procedure Used

US EPA Method (United State Environmental Protection Agency)

This certificate is traceable to national standard, which realize the units of measurement according to the International System of Units (SI).

### Result of Calibration

This certificate may not be reproduced other than in full except with prior Written approval of the Technical Manager, Envi Equipment Service Company Limited.

These reported uncertainties of measurement are expanded by a coverage factor of k=2, providing a 95% confidence level

Calibrated by :

Approved by :

Technical Manager

เอกสารไม่ควบคุม

### List of Instruments Certification for Air & Noise Quality Analysis

No.	Instrument/Equipment	Parameter	Manufacturer	Model/Serial No.	Calibrator	Certification No.	Date of Calibration	Due date of Calibration	Remark
<b>Workplace</b>									
1	Sound Level Calibrator (Acoustic Calibrator)	Calibrate Sound Level Meter	Svantek	SV35A 73249	Innovative Instrument Co.,Ltd.	21-ACT-187	28 May 21	27 May 22	-
2	Sound Level Meter	$L_{Aeq, 8 \text{ hours}}$ $L_{Amax}$	Rion, Japan	NL-42 00409050	Innovative Instrument Co.,Ltd.	22-ACT-067	3 Feb 22	2 Feb 23	-
3	Sound Level Meter	$L_{Aeq, 8 \text{ hours}}$ $L_{Amax}$	Rion, Japan	NL-42 00709682	Sithiporn Associates Co., Ltd.	ACL22075	25 Jan 22	24 Jan 23	-
4	Sound Level Meter	$L_{Aeq, 8 \text{ hours}}$ $L_{Amax}$	Larson Davis	LxT2 0005400	Innovative Instrument Co.,Ltd.	22-ACT-036	21 Jan 22	20 Jan 23	-
5	Sound Level Meter	$L_{Aeq, 8 \text{ hours}}$ $L_{Amax}$	Larson Davis	LxT2 0005402	Innovative Instrument Co.,Ltd.	22-ACT-103	11 Feb 22	10 Feb 23	-
6	Sound Level Meter	$L_{Aeq, 8 \text{ hours}}$ $L_{Amax}$	Larson Davis	LxT2 0006614	Innovative Instrument Co.,Ltd.	22-ACT-104	11 Feb 22	10 Feb 23	-
7	Noise Dosimeter	Noise Dosimeter	Svantek	SV 104S 67627	Innovative Instrument Co.,Ltd.	21-ACT-361	20 Sep 21	19 Sep 22	-
8	Noise Dosimeter	Noise Dosimeter	Svantek	SV 104 91923	Innovative Instrument Co.,Ltd.	22-ACT-114	17 Feb 22	16 Feb 23	-
9	Noise Dosimeter	Noise Dosimeter	Svantek	SV 104 91925	Innovative Instrument Co.,Ltd.	22-ACT-033	21 Jan 22	20 Jan 23	-
10	Sound Level Calibrator (Acoustic Calibrator)	Calibrate Sound Level Meter	Svantek	SV36 107224	Innovative Instrument Co.,Ltd.	21-ACT-326	24 Aug 21	23 Aug 22	-

METHOD 5 CONSOLE CALIBRATION  
USING REFERENCE WET GAS METER W-NK-2.5-B-Z No.547425  
5-POINT METRIC UNIT

Meter Console Information				Calibration Conditions				Factors/Conversions			
Console Model	XC-572-V			Date	Time	02/9/2021	01:00 PM	Std Temp	293	K	
Console Serial Number	0807048			Calibration Reference No.				Std Press	760	mm Hg	
DCM Model Number	SK25EX			Barometric Pressure	761.00		mm Hg	K <sub>0</sub>	0.386		
DCM Serial Number	00103811			Calibration Meter Camera	0.999			Console Leak Check	PASS		

Calibration Data											
Metering Console						Calibration Meter					
Run Time	DCM Orifice	Volume Initial	Volume Final	Volume Initial	Volume Final	Volume Initial	Volume Final	Volume Initial	Volume Final	Volume Initial	Volume Final
Elapsed (Q)	DH (P <sub>in</sub> ) mm H <sub>2</sub> O	(V <sub>in</sub> ) m <sup>3</sup>	(V <sub>out</sub> ) m <sup>3</sup>	Temp Initial (t <sub>in</sub> ) °C	Temp Final (t <sub>out</sub> ) °C	Temp Initial (t <sub>in</sub> ) °C	Temp Final (t <sub>out</sub> ) °C	Temp Initial (t <sub>in</sub> ) °C	Temp Final (t <sub>out</sub> ) °C	Temp Initial (t <sub>in</sub> ) °C	Temp Final (t <sub>out</sub> ) °C
12.27	13.0	544.3460	544.4860	25	25	32.17136	32.30750	24	24	24	24
12.40	13.0	544.4860	544.6260	24	24	32.30750	32.44364	24	24	24	24
8.77	26.0	544.6320	544.7720	24	24	32.44362	32.58574	24	24	24	24
8.58	26.0	544.7720	544.9120	24	24	32.58574	32.72218	24	24	24	24
14.17	40.0	545.0160	545.1990	24	24	32.72286	33.00296	23	23	23	23
14.17	40.0	545.1990	545.4790	24	24	33.00296	33.27582	23	23	23	23
10.45	70.0	545.4860	545.7670	25	25	33.27580	33.54462	23	23	23	23
10.42	70.0	545.7670	546.0170	26	26	33.54462	33.82300	23	23	23	23
9.18	90.0	546.0590	546.3390	26	26	33.82362	34.10576	23	23	23	23
9.15	90.0	546.3390	546.6190	27	27	34.10576	34.37388	23	23	23	23

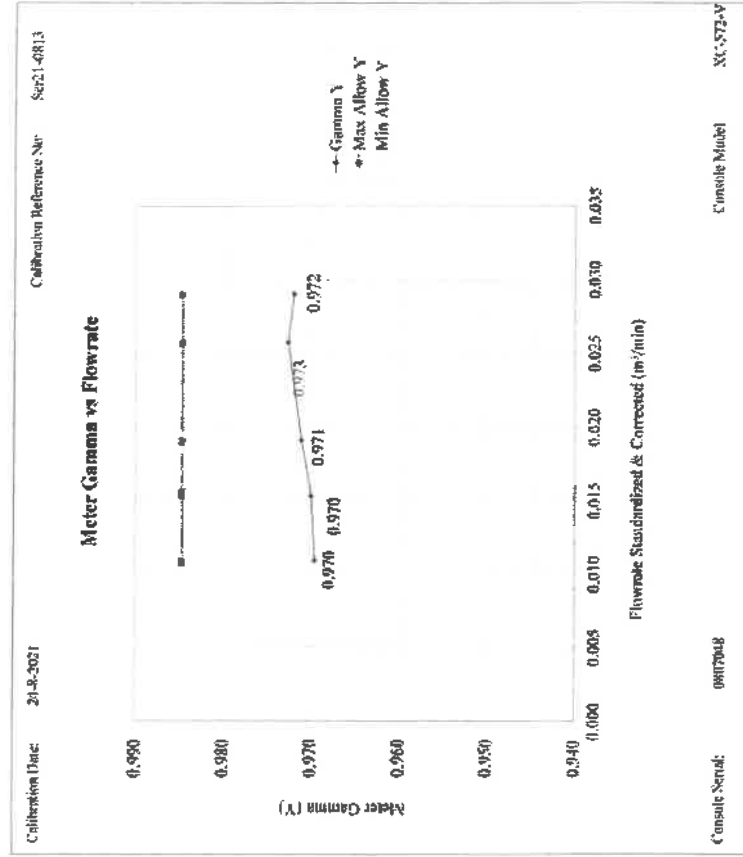
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METHOD 5 CONSOLE CALIBRATION  
USING REFERENCE WET GAS METER W-NK-2.5-B-Z No.547425  
5-POINT METRIC UNIT

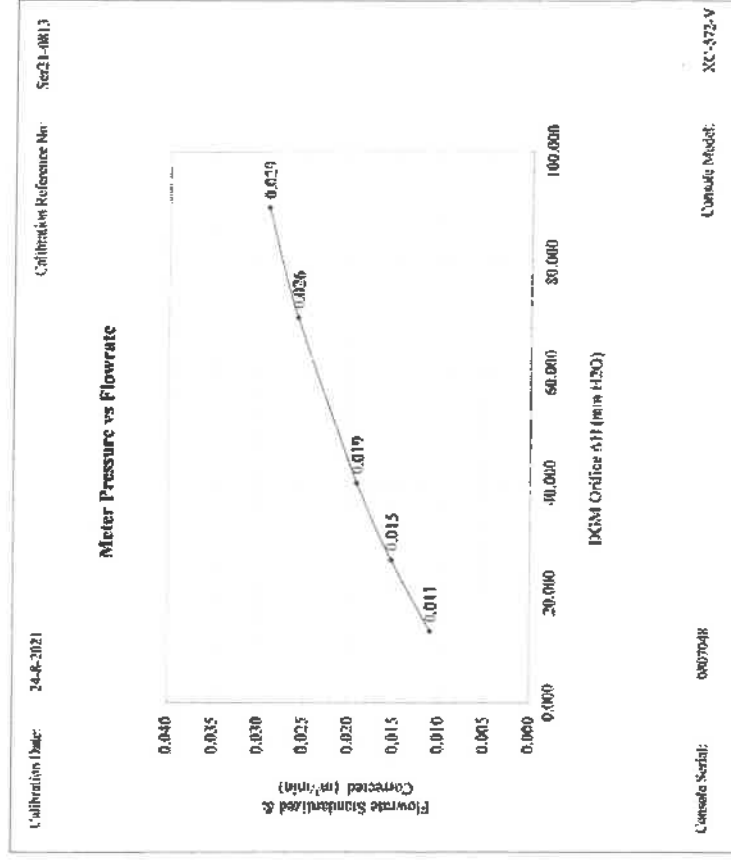
Calibration Data Results											
Standardized Data						Dry Gas Meter					
Dry Gas Meter (V <sub>std</sub> ) m <sup>3</sup>	(Q <sub>std</sub> ) m <sup>3</sup> /min	(V <sub>ref</sub> ) m <sup>3</sup>	(Q <sub>ref</sub> ) m <sup>3</sup> /min	Calibration Factor		Calibration Meter (V <sub>ref</sub> ) m <sup>3</sup>	(Q <sub>ref</sub> ) m <sup>3</sup> /min	Flowrate		Variation (ΔH <sub>g</sub> ) mm H <sub>2</sub> O	Variation (ΔH <sub>g</sub> )
				Value (Y)	Variation (ΔY)			Std & Corr (Q <sub>std</sub> ) m <sup>3</sup> /min	Std & Corr (Q <sub>std</sub> ) m <sup>3</sup> /min		
0.138	0.011	0.134	0.011	0.970	0.006	0.011	0.011	0.011	0.011	48.384	-0.204
0.138	0.011	0.134	0.011	0.969	0.004	0.011	0.011	0.011	0.011	49.583	0.485
0.139	0.016	0.135	0.015	0.971	0.006	0.015	0.015	0.015	0.015	49.356	0.758
0.139	0.016	0.135	0.016	0.971	0.007	0.016	0.016	0.016	0.016	47.308	-1.298
0.279	0.020	0.271	0.019	0.974	0.010	0.019	0.019	0.019	0.019	49.084	0.486
0.279	0.020	0.270	0.019	0.970	0.005	0.019	0.019	0.019	0.019	49.531	0.933
0.280	0.027	0.269	0.026	0.961	-0.004	0.026	0.026	0.026	0.026	47.696	-0.902
0.279	0.027	0.268	0.026	0.958	-0.006	0.026	0.026	0.026	0.026	48.004	-0.594
0.280	0.030	0.267	0.029	0.954	-0.011	0.029	0.029	0.029	0.029	48.418	-0.180
0.280	0.031	0.265	0.029	0.948	-0.016	0.029	0.029	0.029	0.029	48.614	0.016
Y Average										48.598	DH <sub>g</sub> Average

Note: For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter, acceptable tolerance of individual values from the average is ±0.02.  
For ΔH<sub>g</sub>, orifice pressure differential that equates to 0.75 cm (0.0212 m<sup>3</sup>/min) at standard temperature and pressure, acceptable tolerance of individual values from the average is ±0.2 inches (5.1mm) H<sub>2</sub>O.

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## เอกสารไม่ควบคุม



## เอกสารไม่ควบคุม

## THERMOCOUPLES SYSTEM CALIBRATION

Sampling System Equipment Information		Calibration Conditions	
Console Model Number	XC-372-V	Date	02/07/2021 03:30 PM
Console Serial Number	0807048	Calibration Reference No.	
DGM Model Number	SK23EX	Reference Thermometer	DIGICON
DGM Serial Number	00003811	Serial Number	183169105
Meter Box Model Number	JENCO 765 KIF		
Meter Box Serial Number	JC 08944		

Results											
Console Thermocouple Simulator											
Channel and test point	Meter Box Channel Temperature Reading (°C)										
	-18.0	25.0	38.0	93.0	149.0	268.0	371.0	482.0	593.0	816.0	1038.0
Stick	-17.0	26.0	39.0	94.0	150.0	261.0	372.0	482.0	593.0	816.0	1038.0
Aux	-17.0	26.0	39.0	94.0	150.0						
Probe	-17.0	26.0	39.0	94.0	150.0						
Filter	-17.0	26.0	39.0	94.0	150.0						
Oven	-	-	-	-	-						
Exit	-17.0	26.0	39.0								

Tolerance Range		Meter	
Stick	± 1.50%	Absolute	± 3.0 °C
Probe	± 3.0 °C	Exit	± 2.0 °C
Filter	± 3.0 °C		

Instrument description : Flue Gas Analyzer  
Instrument model : Testo 350 New  
Instrument serial no. : 60899455  
ID no. or control no. : UAE.EFM.005/2560  
Manufacturer : testo SE  
Probe description :  
Probe model :  
Probe serial :  
Customer name : UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.  
Customer address : 81 SOI UDONGSUKAI, SUKHUMVIT ROAD, BANGCHAK PRAKANONG  
BANGKOK 10260

Total pages of certificate : 2 Pages  
Receiving no. : L-211963  
Receiving date : 14-JUL-21  
Parameter of calibration : Gas Calibration(Oxygen 2,501,10,00,21.00 %vol, Carbon Monoxide 80.23,309.9,1003 ppm, Nitric Oxide 10.08,150.9,320.6 ppm, Sulphur Dioxide 50.04,100.9,601.1 ppm, Nitrogen Dioxide 10.20,80.62,202.2 ppm)

Condition of UUC : Used  
Ambient condition : All of the Measurement were carried out the stabilized laboratory  
Temperature : 23 ± 5 °C  
Humidity : 55 ± 15 %RH  
Calibration place : 17/121 Soi Ngamwongwan 47 Yeak 4B, Toongsonghong, Lakul, Bangkok 10210  
Calibration procedure no. : WH-CL-20-C

The calibration certificate expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by coverage factor  $k=2$ , which for a normal distribution corresponds to a coverage probability of approximately 95%.  
This certificate is applied only to item under test Environmental condition.  
This Calibration Certificate may not be reproduced other than in full except with the permission of the issuing laboratory.  
Calibration certificates without signature and seal not valid.  
This calibration certificate documents are traceability to national standards, which realize measurement according to the International System of Units (SI).  
Date of calibration : 04-Aug



Calibration Technician Technical Manager

Standard References (Table 1)

Standard	Certificate No.	Vendor	Due date
Oxygen (O <sub>2</sub> ) 2.501 % Vol	2431/19	Unde	16-Jul-23
Oxygen (O <sub>2</sub> ) 10.00 % Vol	2453/19	Unde	18-Jul-23
Oxygen (O <sub>2</sub> ) 21.00 % Vol	2426/19	Unde	24-Jul-23
Carbon monoxide (CO) 80.97 ppm	2842/21	Unde	24-Jul-23
Carbon monoxide (CO) 309.9 ppm	2803/21	Unde	22-Jun-23
Carbon monoxide (CO) 1003 ppm	2829/21	Unde	23-Apr-23
Nitric Oxide (NO) 10.08 ppm	3241/21	Unde	25-Jul-23
Nitric Oxide (NO) 150.9 ppm	2857/21	Unde	27-Jun-23
Nitric Oxide (NO) 320.6 ppm	2944/21	Unde	02-Jul-23
Sulphur Dioxide (SO <sub>2</sub> ) 50.04 ppm	3206/21	Unde	25-Jul-23
Sulphur Dioxide (SO <sub>2</sub> ) 100.9 ppm	4942/20	Unde	20-Nov-22
Sulphur Dioxide (SO <sub>2</sub> ) 603.1 ppm	3204/21	Unde	20-Jul-23
Nitrogen Dioxide (NO <sub>2</sub> ) 10.20 ppm	2929/19	Unde	27-Aug-21
Nitrogen Dioxide (NO <sub>2</sub> ) 80.62 ppm	3240/21	Unde	25-Jul-23
Nitrogen Dioxide (NO <sub>2</sub> ) 202.2 ppm	3239/21	Unde	20-Jul-23

Measured room conditions

Temperature : 23.2 °C Humidity : 53.8 %RH Pressure : 1015.3 mbar

Calibration conditions

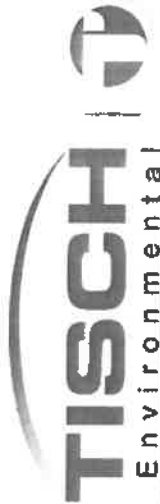
Gas Temperature : 23 °C Flow rate : 1,400 ml/min Gas pressure : 1021.6 mbar

Calibration Results (without adjustment) (Table 2)

Parameter of Standard	Standard Values	Mean of UUC	Error	Uncertainty (%)
O <sub>2</sub> (%Vol)	2.501	2.47	-0.031	0.20
O <sub>2</sub> (%Vol)	10.00	9.86	-0.14	0.40
O <sub>2</sub> (%Vol)	21.00	21.14	0.14	0.80
CO (ppm)	80.97	82	1.03	2.8
CO (ppm)	309.9	310	0.1	11
CO (ppm)	1003	999	-4	34
NO (ppm)	10.08	9	-1.08	3.0
NO (ppm)	150.9	151	0.1	5.0
NO (ppm)	320.6	322	1.4	10
SO <sub>2</sub> (ppm)	50.04	49	-1.04	5.0
SO <sub>2</sub> (ppm)	100.9	101	0.1	5.0
SO <sub>2</sub> (ppm)	601.1	599	-2.1	14
NO <sub>2</sub> (ppm)	10.20	9.9	-0.30	1.5
NO <sub>2</sub> (ppm)	80.62	80.3	-0.32	5.0
NO <sub>2</sub> (ppm)	202.2	198.9	-3.3	5.0

Remark: 1 cmol/mol = 1 %vol., 1 mol/mol = 1 ppm.

End of Report



RECALIBRATION  
DUE DATE:  
July 27, 2021

Certificate of Calibration

Calibration Certification Information

Cal. Date: July 27, 2020.	Rootmeter S/N: 438320	Tr: 298
Operator: Jim Tisch		Pr: 749.3
Calibration Model #: TE-5025A	Calibrator S/N: 3383	

Rem	Vol. Inlet (ml)	Vol. Final (ml)	ΔVol. (ml)	ΔTime (min)	ΔP (mm Hg)	ΔH (in H <sub>2</sub> O)
1	1	2	1	1.4020	3.2	2.00
2	3	4	1	1.0000	6.3	4.00
3	5	6	1	0.8920	7.8	5.00
4	7	8	1	0.8430	8.7	5.50
5	9	10	1	0.7810	12.7	8.00

Data Tabulation

Vstd (ml)	Qstd (x-axis)	$\sqrt{\frac{P_a - P_{std}}{P_{std} \times T_{std}} \times \frac{T_a}{T_a}}$ (y-axis)	Va	Qa (x-axis)	$\sqrt{\frac{\Delta H}{T_a} \times \frac{T_{std}}{T_a}}$ (y-axis)
0.9817	0.7002	1.4042	0.9937	0.7102	0.8919
0.9776	0.9776	1.9859	0.9916	0.9916	1.2613
0.9757	1.0938	2.2703	0.9896	1.1094	1.4101
0.9745	1.1560	2.3286	0.9884	1.1725	1.4790
0.9692	1.3826	2.8084	0.9831	1.4024	1.7837
QA	m= 2.04993			m= 1.28353	
	b= -0.02762			b= -0.01754	
	r= 0.99985			r= 0.99985	

Calculations

Vstd = ΔVol(Pa - ΔP)/(Pstd × Tstd/Ta)	Va = ΔVol(Pa - ΔP)/(Pa)
Qstd = Vstd/ΔTime	Qa = Va/ΔTime
Qstd = 1/m $\left( \sqrt{\frac{P_a - P_{std}}{P_{std} \times T_{std}} \times \frac{T_a}{T_a}} \right) - b$	Qa = 1/m $\left( \sqrt{\frac{\Delta H}{T_a} \times \frac{T_{std}}{T_a}} \right) - b$

Standard Conditions

Tstd:	298.15 °K
Pstd:	760 mm Hg
Key	
ΔH: calibrator manometer reading (in H <sub>2</sub> O)	
ΔP: rootmeter manometer reading (mm Hg)	
Ta: actual absolute temperature (°K)	
Pa: actual barometric pressure (mm Hg)	
b: intercept	
m: slope	

RECALIBRATION

US EPA recommends annual recalibration per 1998 40 Code of Federal Regulations Part 50 to 51, Appendix 8 to Part 50, Reference Method for the Determination of Suspended Particulate Matter in the Atmosphere, 9.2.17, page 30

Tisch Environmental, Inc.  
145 South Miami Avenue  
Village of Cleves, OH 45002

www.tisch-env.com  
Tel: (513) 467-7610  
Fax: (513) 467-9009





TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)  
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES  
534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUAN JANG, BANGKOK 10250  
TEL. 0-2712-3066-34 FAX. 0-2719-9484

## Certificate of Calibration

Certificate No. : 22P800  
Page : 1 of 2

Equipment : U-Tube Manometer  
Manufacturer : Dwyer  
Model : 1221-38-WM  
Serial No. :  
ID No. : UAE.EFM.022/2560  
Condition As-Received : Used Item  
Received Date : 03 March 2022  
Calibration Date : 12 March 2022  
Reference : 2203-0131WSC  
Ambient Temperature : ( 23 ± 2 ) °C  
Relative Humidity : ( 50 ± 15 ) %  
Atmospheric Pressure : 1010 mbar

Submitted by : United Analyst and Engineering Consultant Co., Ltd.

81 Soi Udomsak 41, Suktumvit Road, Bangchak,  
Phraekharong, Bangkok 10260

Procedure used : The calibration was conducted by direct comparison method against Pressure Measuring Instruments Standard according to in-house calibration procedure CP-P04, using " Dwyer 8-1 ; Calibration of Pressure Gauges, Edition 03/2014 " as a guidelines.

Condition of this result of calibration

1. Reference standards instruments :

Instrument	Model	Serial No.	Certificate No.	Due Date
Pressure Calibrator	PC100P	1189	MP-0110-21	09 Aug 2022

2. This result of calibration was made on requested at the point specified by customer.

3. Scale and conversion factor is 1 MPa = 4.0146293 inH<sub>2</sub>O

4. This instrument was used clean air as pressure media.

5. This instrument was calibrated by applied pressure to high-port (+) side and low-port (-) side open to atmospheric pressure

6. This instrument was installed in vertical orientation and top of the pressure port was used as the reference level.

7. The certificate is valid only to the item calibrated on date and piece of calibration.

8. This Calibration is traceable to the International System of Unit maintained at-

-National Institute of Metrology Thailand (NIMT)

Calibrated by : Suwit Aueasara  
Issue Date : 14 March 2022

Approved Signature

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B 0282413



Cert.No.: 22P800  
Page: 2 of 2

Result of calibration:- Without adjustment  
Function:- Pressure Measurement  
Increasing Pressure  
Range: 0 inH<sub>2</sub>O to 36 inH<sub>2</sub>O  
Scale Interval: 0.1 inH<sub>2</sub>O (The Fifth Estimate)

Applied Pressure (inH <sub>2</sub> O)	UUC Indication		Error (inH <sub>2</sub> O)
	High-port side (inH <sub>2</sub> O)	Low-port side (inH <sub>2</sub> O)	
0.00	0.00	0.00	0.00
2.00	1.00	-1.00	0.00
4.00	2.00	-2.00	0.00
6.00	3.00	-3.00	0.00
8.00	4.00	-4.00	0.00
10.00	5.00	-5.00	0.02
12.00	6.00	-6.00	0.02
14.00	7.00	-7.00	0.04
16.00	8.00	-8.00	0.04
18.00	9.00	-9.00	0.04
20.00	10.00	-10.00	0.04
22.00	11.00	-11.00	0.02
24.00	12.00	-12.00	0.02
26.00	13.00	-13.00	0.02
28.00	14.00	-14.00	0.04
30.00	15.00	-15.00	0.04
32.00	16.00	-16.00	0.04
34.00	16.98	-17.02	0.04
36.00	17.98	-18.02	0.18

The uncertainty of measurement was ± 0.11 inH<sub>2</sub>O

\* UUC = UUC Under Calibration

\* ΔP = High-port side - Low-port side

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

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B 1099526



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)  
CORPORATE SERVICES & EQUIPMENT CALIBRATION AND TESTING SERVICES  
53/42 PATTANAKARN ROAD SOI 14 SUKHUMVIT, SUKHUMVIT, BANGKOK 10250  
TEL. 0-2712-3000-24 FAX. 0-2716-0424



NIST  
CALIBRATION DATA

## Certificate of Calibration

Certificate No. : 21P2500  
Page : 1 of 2

Equipment : Aneroid Barometer  
Manufacturer : Barigo  
Model :  
Serial No. :  
ID No. : UAE/ANV/123/2500  
Condition As-Received: Used Item  
Received Date: 20 July 2021  
Calibration Date: 21 July 2021  
Reference: 2107-0570W/SC  
Ambient Temperature: ( 23 ± 2 ) °C  
Relative Humidity: ( 50 ± 15 ) %  
Atmospheric Pressure: 1009 mbar

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except with the prior written approval of the head of  
Corporate Services & Equipment Calibration and Testing Services.

Submitted by: United Analyst and Engineering Consultant Co., Ltd.

81 Soi Udomsak 41, Sukhumvit Road, Bangkok,  
Phrethnamong, Bangkok 10260

Procedure used: The calibration was conducted by direct comparison method against Pressure Measuring Instruments  
Standard according to in-house calibration procedure CP-P10, using " DKD-R 6-1 ; Calibration of Pressure  
Gauges, Edition 03/2014 " as a guideline.

### Condition of this result of calibration:

1. Reference standards instruments :

Instrument

1) Standard Barometer

Model CP1142

Serial No. 142205046

Certificate No. NP-0053-21

Due Date 08 Apr 2022

2. This instrument was installed in vertical orientation and center of the dial was used as the reference level.

3. This result of calibration was made on requested at the point specified by customer.

4. This instrument was used clean air as pressure media.

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

6. This Certificate is traceable to the International System of Unit maintained at:-

National Institute of Metrology Thailand (NIMT)

Calibrated by  
Issue Date : 22 July 2021

Approved Signatory :

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0264463



Cert.No.: 21P2500  
Page: 2 of 2

Result of calibration:- Without adjustment  
Full Scale Absolute Pressure Range: 800 hPa to 1030 hPa  
Scale Interval: 1 hPa ( The Fifth Estimate )

Increasing Pressure	958.50	959.64	979.40	990.54	1000.62	1010.72	1020.78	1031.18
Applied Pressure (hPa)	960.0	970.0	980.0	990.0	1000.0	1010.0	1020.0	1030.0
UUC* Indication (hPa)	958.5	969.6	979.4	990.5	1000.6	1010.7	1020.8	1031.2
Error (hPa)	-1.5	-0.4	-0.6	-0.5	-0.4	-0.3	-0.2	-0.1

Decreasing Pressure	1031.28	1020.72	1010.67	1000.58	990.42	979.33	968.44	958.28
Applied Pressure (hPa)	1030.0	1020.0	1010.0	1000.0	990.0	980.0	970.0	960.0
UUC* Indication (hPa)	1031.3	1020.7	1010.7	1000.6	990.4	979.3	968.4	958.3
Error (hPa)	+1.3	-0.7	-0.7	-0.6	-0.4	-0.7	-1.4	-3.7

The uncertainty of measurement was ± 0.30 hPa

\* UUC = Unit Under Calibration

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

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0264463



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)  
CORPORATE SERVICES & EQUIPMENT CALIBRATION AND TESTING SERVICES  
3344 TATANKAKU ROAD SOI 16, SUANLUANG, BANGKOK 10310  
TEL. 0-2317-3000-34 FAX. 0-2317-9484



## Certificate of Calibration

Certificate No.: 22H771  
Page: 1 of 2

Equipment: Dett Thermo-Hygrometer  
Manufacturer: Barigo  
Model: -  
Serial No.: UAE.ANY.0032548  
ID No.: -  
Condition As-Received: Used Item  
Received Date: 30 March 2022  
Calibration Date: 01 April 2022  
Reference: 2203-1124WISC  
Ambient Temperature: ( 25 ± 3 ) °C  
Relative Humidity: ( 50 ± 20 ) %

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except with the prior written approval of the head of  
Corporate Services & Equipment Calibration and Testing Services.

Submitted by: United Analyst and Engineering Consultant Co., Ltd.

81 Soi Udornrak 41, Sukhumvit Road, Bangkok,  
Phraekhanong, Bangkok 10260

Procedure used: Calibration was conducted using in-house calibration procedure CP-1422 according to comparison  
with standard chilled mirror sensor for humidity measurement function and comparison with standard  
temperature probe for temperature measurement function into humidity / temperature chamber.

### Condition of this result of calibration

1. Reference standards maintained:

Instrument	Model	Serial No.	Certificate No.	Due Date
1) Standard Chilled Mirror Hygrometer Sensor	Dew Point II	31883	18714	17 Sep 2022
2) Standard Humidity/Temperature Meter	400	10203027	TH-0083-21	01 Jul 2022

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

3. This Certificate is traceable to the International System of Unit maintained at:-

-National Institute of Standards and Technology (NIST), The United States of America  
-National Institute of Metrology Thailand (NIMT)

Calibrated by: [Redacted]  
Issue Date: 08 April 2022

Approved Signatory: [Redacted]

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# 0285423



Cert No.: 22H771  
Page: 2 of 2

Result of Calibration:-		Without Adjustment	
Function:	Reference Temperature (°C)	Humidity measurement Standard Humidity (%R.H.)	UUC* Reading (%R.H.)
	25.0	40.1	42
	25.0	60.0	61
	25.0	80.0	78
		Error (%R.H.)	Uncertainty of Measurement (%R.H.)
		1.9	1.8
		1.0	1.8
		-2.0	2.0

Result of Calibration:-		Without Adjustment	
Function:	Temperature Standard Temperature (°C)	Temperature measurement UUC* Reading (°C)	Uncertainty of Measurement (±°C)
	20.02	20.0	0.02
	29.98	30.0	0.02
	35.02	35.0	0.02
	40.03	40.0	0.02

UUC\* : Unit Under Calibration

The reported uncertainty of measurement was based on standard uncertainty multiplied by coverage factor k = 2.00, providing confidence level approximately 95%.

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# 1104141

### MULTI-POINT GAS TEST REPORT

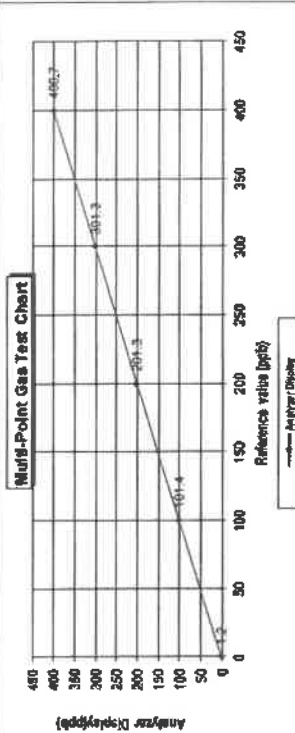
Test Date : Dec 8, 2021

Equipment : Gas Analyzer (NO<sub>2</sub>) Model : 421  
Manufacturer : Thermo Scientific Serial Number : 1201778108

**Standard Gas Concentration**  
Sulphur Dioxide (SO<sub>2</sub>) 44.75 PPM Manufacturer : Thermo Scientific  
Nitric Oxide (NO) 45.35 PPM Model : 148  
Methane (CH<sub>4</sub>) - PPM Serial Number : 1180540071  
Carbon Monoxide (CO) 1007 PPM  
Cylinder No. : CC159599  
Expiration Date : Jul 30, 2022

#### Multi-point gas test data

Reference Value (ppb)	Analyzer Display (ppb)	Difference Error	Percent Error	% Error
Level 1 Zero	0.0	1.2	1.20	1.20
Level 2 20.00%	100.0	101.4	1.40	1.38
Level 3 40.00%	200.0	201.3	1.30	0.65
Level 4 60.00%	300.0	301.3	1.30	0.43
Level 5 80.00%	400.0	400.7	0.70	0.17
Remark : Measuring Range 500.0 ppb				
Acceptable Limit $\pm 5\%$				
Average Difference (%) 0.77				



8, 12, 1, 64

8, 12, 1, 64

### MULTI-POINT GAS TEST REPORT

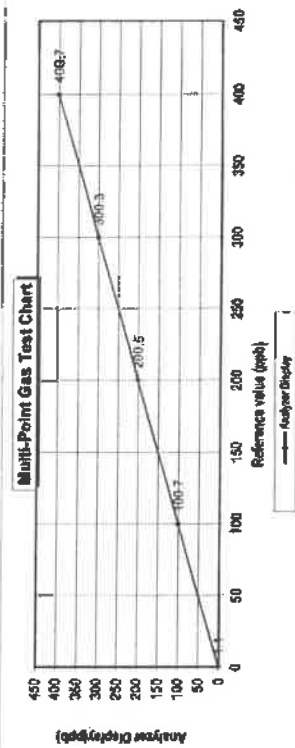
Test Date : Dec 8, 2021

Equipment : Gas Analyzer (NO<sub>2</sub>) Model : 421  
Manufacturer : Thermo Scientific Serial Number : 1201778109

**Standard Gas Concentration**  
Sulphur Dioxide (SO<sub>2</sub>) 44.75 PPM Manufacturer : Thermo Scientific  
Nitric Oxide (NO) 45.35 PPM Model : 148  
Methane (CH<sub>4</sub>) - PPM Serial Number : 1180540071  
Carbon Monoxide (CO) 1007 PPM  
Cylinder No. : CC159599  
Expiration Date : Jul 30, 2022

#### Multi-point gas test data

Reference Value (ppb)	Analyzer Display (ppb)	Difference Error	Percent Error	% Error
Level 1 Zero	0.0	1.1	1.10	1.10
Level 2 20.00%	100.0	100.7	0.70	0.70
Level 3 40.00%	200.0	200.5	0.50	0.25
Level 4 60.00%	300.0	300.3	0.30	0.10
Level 5 80.00%	400.0	400.7	0.70	0.17
Remark : Measuring Range 500.0 ppb				
Acceptable Limit $\pm 5\%$				
Average Difference (%) 0.46				



8, 12, 1, 64

8, 12, 1, 64

MULTI-POINT GAS TEST REPORT

Test Date : Nov 17, 2021

Equipment : Gas Analyzer (NO<sub>2</sub>)  
Manufacturer : Thermo Scientific  
Model : 42i  
Serial Number : 1201778105

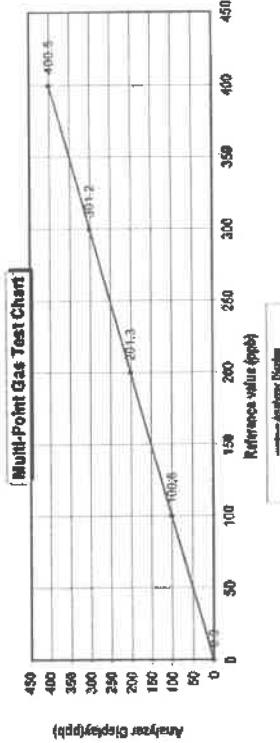
Standard Gas Concentration  
Sulphur Dioxide (SO<sub>2</sub>) 44.75 PPM  
Nitric Oxide (NO) 45.35 PPM  
Methane (CH<sub>4</sub>) - PPM  
Carbon Monoxide (CO) 1007 PPM  
Cylinder No. : CC159599  
Expiration Date : Jul 30, 2022

Dilutor Detail  
Manufacturer : Thermo Scientific  
Model : 146i  
Serial Number : 1180340071

MULTI-POINT GAS TEST DATA

Level	Reference Value (ppb)	Analyzer Display (ppb)	Difference Error	Percent Error	[% Error]
Level 1	Zero	0.0	0.90	0.90	0.90
Level 2	20.00%	100.0	0.60	0.60	0.60
Level 3	40.00%	200.0	1.30	0.65	0.65
Level 4	60.00%	300.0	1.20	0.40	0.40
Level 5	80.00%	400.0	0.50	0.12	0.12
Level 6	100.00%	500.0	0.50	0.10	0.10

Remark : Measuring Range : 500.0 ppb  
Acceptable Limit  $\pm 5\%$



12 Nov 2021

17 Nov 2021

CERTIFICATE OF ANALYSIS  
Grade of Product: EPA Protocol

Part Number: E04N89E15A01QC  
Cylinder Number: CC159599  
Laboratory: 124 - Pleasanton - PA  
PGVP Number: A12019  
Gas Code: CO,NO,NO<sub>2</sub>,SO<sub>2</sub>,BALN  
Reference Number: 180-401526182-1  
Cylinder Volume: 144.4 CF  
Cylinder Pressure: 2015 PSIG  
Valve Outlet: 660  
Certification Date: Jul 30, 2019  
Expiration Date: Jul 30, 2022

Certification performed in accordance with EPA Methodology for Analytical Methodology does not require certification for analytical results. This cylinder has a full analytical uncertainty as stated below with a confidence level of 95%. Values shown below are the use of the calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 MPa absolute.

ANALYTICAL RESULTS				
Component	Requested Concentration	Actual Concentration	Protocol Method	Assay Date
NOX	45.00 PPM	44.76 PPM	G1	07/23/2019, 07/30/2019
NITRIC OXIDE	45.00 PPM	44.76 PPM	G1	07/23/2019, 07/30/2019
SULFUR DIOXIDE	45.00 PPM	45.35 PPM	G1	07/23/2019, 07/30/2019
CARBON MONOXIDE	1000 PPM	1007 PPM	G1	07/23/2019
NITROGEN	Balance			
CALIBRATION STANDARDS				
Type	Lot ID	Cylinder No	Concentration	Uncertainty
NTRM	18060121	KAL004215	248.9 PPM NITRIC OXIDE/NITROGEN	$\pm 0.4\%$
NTRM	052411	KAL004307	50.03 PPM NITRIC OXIDE/NITROGEN	$\pm 0.80\%$
NTRM	18060121	KAL004215	250.0 PPM NITRIC OXIDE/NITROGEN	$\pm 0.4\%$
NTRM	052411	KAL004307-NOX	50.03 PPM NITRIC OXIDE/NITROGEN	$\pm 0.80\%$
NTRM	0141709	KAL003180	49.67 PPM SULFUR DIOXIDE/NITROGEN	$\pm 1.0\%$
NTRM	072508	KAL004570	976.0 PPM CARBON MONOXIDE/NITROGEN	$\pm 0.4\%$
ANALYTICAL EQUIPMENT				
Instrument/Make/Model	Analytical Principle			
CO MKS FTIR 000220062	FTIR			
NO MKS FTIR 000220062	FTIR			
NO MKS FTIR 000220062	FTIR			
SO2 MKS FTIR 000220062	FTIR			

Test Data Available Upon Request

NOTES: RAN# S1315-CM03

PCW 5218002210

GROSS WEIGHT: 28.6 KG

NET WEIGHT: 4.1 KG



### MULTI-POINT GAS TEST REPORT

Test Date : Nov 30, 2021

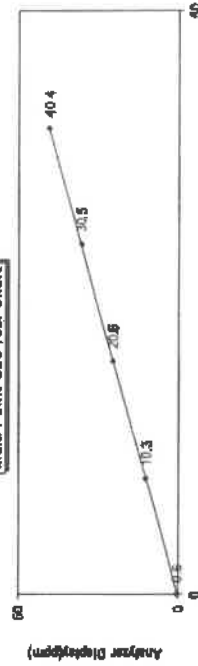
Equipment : Gas Analyzer (CO) Model : 481  
Manufacturer : Thermo Scientific Serial Number : 1201497730

**Standard Gas Concentration**  
Sulphur Dioxide (SO<sub>2</sub>) 44.75 PPM Manufacturer : Thermo Scientific  
Nitric Oxide (NO) 45.35 PPM Model : 1461  
Methane (CH<sub>4</sub>) - PPM Serial Number : 1180540071  
Carbon Monoxide (CO) 1007 PPM  
Cylinder No. : CCI59599  
Expiration Date : Jul 30, 2022

#### Multi-point gas test data

Level	Reference Value (ppm)	Analyzer Display (ppm)	Difference Error	Percent Error	% Error I
Level 1	Zero	0.0	0.6	0.6	0.6
Level 2	20.00%	10.3	0.3	2.9	2.9
Level 3	40.00%	20.6	0.6	2.9	2.9
Level 4	60.00%	30.5	0.5	1.6	1.6
Level 5	80.00%	40.4	0.4	1.0	1.0
Remark : Measuring Range 50.0 ppm					1.81
Acceptable Limit $\pm 5\%$					

#### Multi-Point Gas Test Chart



Reference value (ppm)  
Analyzer Display

30, Nov, 2021  
3c, Nov, 2021

### MULTI-POINT GAS TEST REPORT

Test Date : Nov 30, 2021

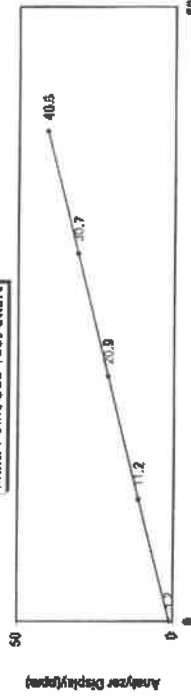
Equipment : Gas Analyzer (CO) Model : 481  
Manufacturer : Thermo Scientific Serial Number : 1201497730

**Standard Gas Concentration**  
Sulphur Dioxide (SO<sub>2</sub>) 44.75 PPM Manufacturer : Thermo Scientific  
Nitric Oxide (NO) 45.35 PPM Model : 1461  
Methane (CH<sub>4</sub>) - PPM Serial Number : 1180540071  
Carbon Monoxide (CO) 1007 PPM  
Cylinder No. : CCI59599  
Expiration Date : Jul 30, 2022

#### Multi-point gas test data

Level	Reference Value (ppm)	Analyzer Display (ppm)	Difference Error	Percent Error	% Error I
Level 1	Zero	0.0	1.2	1.2	1.2
Level 2	20.00%	10.0	11.2	10.7	10.7
Level 3	40.00%	20.0	20.9	4.3	4.3
Level 4	60.00%	30.0	30.7	2.3	2.3
Level 5	80.00%	40.0	40.6	1.5	1.5
Remark : Measuring Range 50.0 ppm					4.00
Acceptable Limit $\pm 5\%$					

#### Multi-Point Gas Test Chart



Reference value (ppm)  
Analyzer Display

30, Nov, 2021  
3c, Nov, 2021

**MULTI-POINT GAS TEST REPORT**

Test Date : Nov 30, 2021

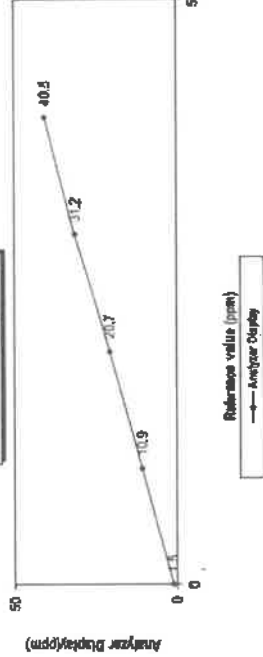
Equipment : Gas Analyzer (CO) Model : 481  
Manufacturer : Thermo Scientific Serial Number : 1201497733

**Standard Gas Concentration**  
Sulphur Dioxide (SO<sub>2</sub>) 44.75 PPM Manufacturer : Thermo Scientific  
Nitric Oxide (NO) 45.35 PPM Model : 1461  
Methane (CH<sub>4</sub>) - PPM Serial Number : 11805540071  
Carbon Monoxide (CO) 1007 PPM  
Cylinder No. : CC139999  
Expiration Date : Jul 30, 2022

**Multi-point gas test data**

Level	Reference Value (ppm)	Analyzer Display (ppm)	Difference Error	Percent Error	[% Error]
Level 1	0.0	1.5	1.5	1.5	1.5
Level 2	10.0	10.9	0.9	8.3	8.3
Level 3	20.0	20.7	0.7	3.4	3.4
Level 4	30.0	31.2	1.2	3.8	3.8
Level 5	40.0	40.5	0.5	1.2	1.2
Average Difference (%)					3.84
Remark : Measuring Range 50.0 ppm					
Acceptable Limit $\pm 5\%$					

**Multi-Point Gas Test Chart**



Signature  
Date: Nov 30, 2021



Airgas Specialty Gases  
Airgas USA, LLC  
1641 Easton Road  
Piquette  
Piquette, PA 16403  
airgas.com

**CERTIFICATE OF ANALYSIS**  
**Grade of Product: EPA Protocol**

Part Number: E04N198E15A01QC Reference Number: 160-401528192-1  
Cylinder Number: CC139999 Cylinder Volume: 144.4 CF  
Laboratory: 124 - Plumsteadville - PA Cylinder Pressure: 2015 PSIG  
PGVP Number: A12019 Valve Outlet: 660  
Gas Code: CO, NO, NOX, SO<sub>2</sub>, BALM Certification Date: Jul 30, 2019  
Expiration Date: Jul 30, 2022

Contribution performed in accordance with EPA Testability Protocol for Analytical Method of Gas Analysis (May 2012) (General EPA Method 8000-12531), using the same procedures. Analytical Methodology does not require correction for cylinder volume. All concentrations are on a dry basis. The concentration of gas in the cylinder is based on the volume of gas in the cylinder. The concentration of gas in the cylinder is based on the volume of gas in the cylinder. The concentration of gas in the cylinder is based on the volume of gas in the cylinder.

Do Not Use This Cylinder Before 100.000 Lb. 0.7 mppscsccs.

**ANALYTICAL RESULTS**

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Date
NOX	45.00 PPM	44.78 PPM	G1	$\pm 0.3\%$ NIST Traceable	07/23/2019, 07/30/2019
NITRIC OXIDE	45.00 PPM	44.78 PPM	G1	$\pm 0.3\%$ NIST Traceable	07/23/2019, 07/30/2019
SULFUR DIOXIDE	45.00 PPM	45.35 PPM	G1	$\pm 1\%$ NIST Traceable	07/23/2019, 07/30/2019
CARBON MONOXIDE	1000 PPM	1007 PPM	G1	$\pm 0.4\%$ NIST Traceable	07/23/2019

**CALIBRATION STANDARDS**

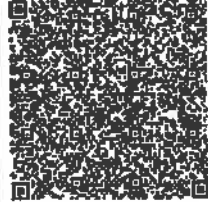
Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NITRIM	13080121	KAL004215	240.5 PPM NITRIC OXIDE/NITROGEN	$\pm 0.4\%$	Nov 08, 2023
NITRIM	082411	KAL004307	50.03 PPM NITRIC OXIDE/NITROGEN	$\pm 0.4\%$	Nov 08, 2023
NITRIM	10860121	KAL004215	250.0 PPM NITRIC OXIDE/NITROGEN	$\pm 0.4\%$	Nov 08, 2023
NITRIM	052411	KAL004307-NOX	50.03 PPM NITRIC OXIDE/NITROGEN	$\pm 0.4\%$	Nov 08, 2023
NITRIM	0141709	KAL003190	48.87 PPM SULFUR DIOXIDE/NITROGEN	$\pm 1.0\%$	Jun 20, 2022
NITRIM	072508	KAL004370	970.0 PPM CARBON MONOXIDE/NITROGEN	$\pm 0.4\%$	May 14, 2021

**ANALYTICAL EQUIPMENT**

Instrument Make/Model	Analytical Principle	Last Multi-point Calibration
CO MKS FTIR 000929002	FTIR	Jul 19, 2018
NO MKS FTIR 000929002	FTIR	Jul 22, 2018
NO MKS FTIR 000929002	FTIR	Jul 22, 2018
SO <sub>2</sub> MKS FTIR 000929002	FTIR	Jul 22, 2018

Test Data Available Upon Request

NOTES: RAN 51319-CM03  
POM 5219002210  
GROSS WEIGHT: 28.6 KG  
NET WEIGHT: 4.1 KG



# THAI METEOROLOGICAL DEPARTMENT

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

## Calibration Certificate



Issued by : Calibration & Test Section : Meteorological Instruments Bureau

Date of Issue : 16 August, 2021 ( Certification No. 38521

Page : 1 of 7

Object : เครื่องวัดความเร็วลมและทิศทาง

Manufacturer : LSI

Type : Data Logger E-LOG 305 wind speed and wind direction DNA 827

Thermoglogometers DMA875 Barometer DQA 801

Mfg Code : Data Logger 18040308 wind speed and wind direction 18020211

Thermoglogometers 18010187 Barometer 18040219

Customer : United Analyst and Engineering Consultant Co., Ltd.

81 Sai Udomsuk 41, Sukhumvit Road,

Bangchak, Prakanong, Bangkok 10260.

Calibration Condition : Temperature 25.1 °C Barometric Pressure 1011.2 hPa

NATIONAL STANDARD WIND TUNNEL : Thermal Anemometer 842 S/N 91563

: HOOK GAGE NO 1425 : Wind Aloft Plotting Board

N.I.S.T. Test Reference Number 731241460

: Ultrasonic Anemometer Model DA-850-3TV (sensor TR-90AH)

Serial Number 110730029 (sensor 120623586)

JAPAN QUALITY ASSURANCE ORGANIZATION

STANDARD THERMOMETER

: Theodor Friedrich : Dry No.8390/SM Wet No. 8389/SM

: Iusto, Iusto 645 Serial No. 02848037

: Thermoschneider No.918802

STANDARD BAROMETER

: Digital Barometer Vaisala Type P183 D No. 180001

: Digital Barometer Vaisala Type P183 D No. 180001

Calibrated by

Mr. Watchara

Mechanical Engineer



# THAI METEOROLOGICAL DEPARTMENT

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

## The Result of Calibration

Wind Speed And Wind Direction

16 August, 2021 Model DNA821 S/N 190020211

Certification No. 38521

Page : 2 of 7

Standard Ultrasonic Anemometer m/sec	HOOK GAGE NO. 1425			TESTED ANEMOMETER		
	Pressure Inches	Vacuum Inches	Pressure MPa	Velocity m/sec	Correction m/sec	
1.00	-	-	-	1.0	0.00	
3.02	-	-	-	2.7	0.32	
5.00	-	-	-	5.0	0.00	
7.04	-	-	-	6.7	0.34	
9.02	-	-	-	9.0	0.02	
11.02	-	-	-	10.7	0.32	
13.01	-	-	-	13.0	0.01	
15.01	-	-	-	14.7	0.31	
17.02	-	-	-	17.0	0.02	
20.02	-	-	-	19.7	0.32	

### Wind Aloft Plotting Board

US DEPARTMENT OF COMMERCE WEATHER BUREAU

WIND DIRECTION		TESTED WIND DIRECTION	
0	0	90	90
90	90	180	180
180	180	270	270

Calibrated

Mechanical Engineer





# Certificate of Calibration

**Customer**  
 Name : UNITED ANALYST AND ENGINEERING CONSULT CO., LTD.  
 Address : 81 Soi Udomsak 41, Sukhumvit Road, Bangkok, Pratsung, Bangkok 10260

**Unit Under Calibration Details**  
 Measurement Item : Acoustic Calibrator  
 Manufacturer : LARSON DAVIS  
 Model : CAL150  
 Serial Number : 6171  
 ID : UAE-EFNA1172502

**Calibration Environment and Details**  
 Temperature : ( 23 ±2 °C )  
 Humidity : ( 50 ± 20 %RH )  
 Barometric Pressure : ( 1013 ± 0.3 hPa )  
 Received Date : 22 July 2021  
 Calibration Date : 24 August 2021  
 Location of Calibration : LAB 1 Acoustic  
 Calibration Procedure : In-house method CP-ACT-02 based on IEC 60942:2017 Electroacoustics - Sound calibrators

Reference Standard	Model	Serial Number	Traceable	Due Calibration
Sound Calibrator	SV 35A	58079	EEL	14 May 2022
THD Multimeter	2015	1047765	NIMT	21 January 2023

**Traceability** : This certificate provides traceability of measurement to recognized national standard, and to the realization of the International System of Units (SI).

**Note**  
 The reported uncertainty is based on standard uncertainty multiplied by the Coverage Factor k=2, providing a level of confidence approximately 95 %.

Calibrated By :



Certificate No : 21-ACT-327  
 Request No : Req-2021-0995

**Calibration Results : Without Adjustment**

Sound pressure level Calibration Range (dB)	Without Adjustment (dB)		Adjustment (dB)		Uncertainty (± dB)	Acceptance limit Class 2 (± dB)
	Measured	Error	Measured	Error		
94 dB / 1000 Hz	94.10	0.10	-	-	0.12	0.40
114 dB / 1000 Hz	114.12	0.12	-	-	0.11	0.40

**Frequency of Sound pressure level**

Calibration Range (Hz)	Without Adjustment		Adjustment		Uncertainty (± %)	Acceptance limit Class 2 (± %)
	Measured (Hz)	Error (%)	Measured (Hz)	Error (%)		
94 dB / 1000 Hz	1000.00	0.09	-	-	0.10	1.7
114 dB / 1000 Hz	1000.00	0.00	-	-	0.10	1.7

**Total Harmonic Distortion plus Noise of Sound pressure level (THD+PN %)**

Calibration Range (Hz)	Without Adjustment		Adjustment		Uncertainty (± %)	Acceptance limit Class 2 (± %)
	Measured (%)	Error (%)	Measured (%)	Error (%)		
94 dB / 1000 Hz	0.04	-	-	-	0.40	3.0
114 dB / 1000 Hz	0.21	-	-	-	0.40	3.0

**Note :**  
 • Acceptance limit was IEC60942:2017 Class 1  
 • The calibration results exclude the calibration reference correction  
 • The calibration results exclude the microphone volume correction

End of Calibration



Cert. No. : ACL22081  
Pages : 1 of 8

## Calibration Certificate

**Equipment :** SOUND LEVEL METER  
**Manufacturer :** LARSON DAVIS  
**Model :** LxT2/ Microphone 375B02 / Preamplifier PRML x T2B  
**Serial No.:** 0005286 / 011740 / 056087  
**ID No.:** -

**Condition As Found :** GOOD  
**Customer :** UNITED ANALYST AND ENGINEERING CONSULTANT (UAE)  
R1 SOI UTOMSUK 41, SUKHUMVIT ROAD,  
BANGRAK SUB-DISTRICT,  
PHRAKHANONG DISTRICT, BANGKOK 10260  
THAILAND.

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

**Received Date :** 18 JANUARY 2022  
**Calibration Date :** 26 JANUARY 2022  
**Date of Issue :** 28 JANUARY 2022

**Calibrated by :** Mahakorn Pisulpaisan

**Approved by :**



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.

**เอกสารไม่ควบคุม**

Cert. No. : ACL22081  
Job No. : VC65AC0044  
Pages : 2 of 8

**Calibration Procedure :** CP-AC-02

### Calibration Method :

This equipment was calibrated by based on IEC-61672-3 (2013) Standard for sound level meter (SLM).  
The SLM had tests to Acoustical and Electrical signal tests of frequency weighting with Anechoic chamber and Reference Standard Instruments.  
For tests results of each items were made by observation of each instruments display and also with SLM's display.

### Condition of this result of calibration :

1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33210A	MY48017076	EF-0012-21	10-Feb-22
Waveform Generator	33511B	MY52302742	EF-0011-21	10-Feb-22
Digital Multimeter	33461A	MY53220104	EEL-BP_05/0264	10-Feb-22
Digital Multimeter	33461A	MY53220076	EEL-BP_03/0264	08-Feb-22
Digital Multimeter	34461A	MY60024273	I-15180725231-1	15-Sep-22
Programmable Acoustics	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 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).

**เอกสารไม่ควบคุม**

Continuation of Calibration Certificate

Continuation of Calibration Certificate

Cert. No. : ACL22881  
Job No. : VC65AC0044  
Pages : 3 of 8

Cert. No. : ACL22881  
Job No. : VC65AC0044  
Pages : 4 of 8

Summary of Measurement Result :

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

Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal (dB )	Measured Value (dB )	Deviation (dB )	Acceptance Limit (dB )
93.9 (93.96)	94.0	0.0	±0.3

2. Self-generated noise

2.1 Normal test

Measured Value (dB )
31.0

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

Frequency Weighting	Measured value (dB )
A - weight	30.8
C - weight	30.6
Flat	36.8

3. Acoustical signal tests of frequency weightings

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

Frequency (Hz )	Deviation from various frequency weighting response curve (dB)		
	Flat	C-weight	A-weight
125	-0.1	0.1	0.0
1000	-0.2	-0.2	-0.2
8000	3.1	3.2	3.2
			Acceptance Limits
			± 1.5
			± 1.0
			± 5.0

Continuation of Calibration Certificate

Cert. No. : ACL22081  
Job No. : YCK5AC0044  
Pages : 5 of 8

4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

Frequency ( Hz )	Deviation from various frequency weighting response curve (dB)		
	Flat	C-weight	A-weight
63	0.0	0.0	0.0
125	0.0	0.0	0.0
250	0.0	0.0	0.0
500	0.0	0.0	0.0
1000	0.0	0.0	0.0
2000	0.0	0.1	0.0
4000	0.0	0.0	0.0
8000	0.0	0.0	0.0
16000	-0.1	0.0	0.1

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

Continuation of Calibration Certificate

Cert. No. : ACL22081  
Job No. : YCK5AC0044  
Pages : 6 of 8

7. Level linearity on the reference level range

Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
135.0	135.1	0.1	± 1.1
134.0	134.1	0.1	± 1.1
133.0	133.1	0.1	± 1.1
132.0	132.1	0.1	± 1.1
131.0	131.1	0.1	± 1.1
129.0	129.1	0.1	± 1.1
124.0	124.1	0.1	± 1.1
119.0	119.1	0.1	± 1.1
114.0	114.1	0.1	± 1.1
109.0	109.1	0.1	± 1.1
104.0	104.1	0.1	± 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	49.1	0.1	± 1.1
44.0	44.2	0.2	± 1.1
39.0	39.6	0.6	± 1.1

Continuation of Calibration Certificate

Cert. No. : ACL22081  
Job No. : VC65AC0044  
Pages : 7 of 8

R. Level linearity including the level range control

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
140	94.0	94.0	0.0	±0.5

9. Tone burst response

Time Weighting	Tone 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	107.8	-0.2	1.5 ; -5.0
	2	8	117.0	116.7	-0.3	1.0 ; -2.5
	200	800	134.0	133.9	-0.1	±1.0
Slow	2	8	108.0	107.8	-0.2	1.5 ; -5.0
	200	800	127.6	127.5	-0.1	±1.0
SEL	0.25	1	N/A	N/A	N/A	1.5 ; -5.0
	2	8	N/A	N/A	N/A	1.0 ; -2.5
	200	800	N/A	N/A	N/A	±1.0

10. Peak C sound level

Number of cycle in test 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	135.7	-0.7	±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	135.2	-0.2	±2.0
Negative half cycle	135.4	135.2	-0.2	±2.0

Continuation of Calibration Certificate

Cert. No. : ACL22081  
Job No. : VC65AC0044  
Pages : 8 of 8

11. Overload indication

Measured value (dB)		Deviated Value (dB)	Acceptance Limits (dB)
Positive one-half cycle	Negative one-half cycle	0.2	±1.5
89.2	89.4		

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

## Certificate of Calibration

Customer  
Name : UNITED ANALYST AND ENGINEERING CONSULTANT CO., LTD.  
Address : 81 Soi Udomsak 41, Sukhumvit Road, Bangkok, Prachuap, Bangkok 10250  
Certificate No : 22-ACT-0014  
Request No : Req-2022-0022

Unit Under Calibration Details  
Measurement Item : Sound Level Meter  
Manufacturer : LAKSON DAVIS  
Model : Lx72  
Serial Number : 0005194  
ID : UAEFRL012564  
Resolution : 0.1 dB  
Calibration Environment and Details  
Temperature : 23 °C ± 1 °C  
Humidity : 50 %RH ± 20 %RH  
Reference Pressure : 1013 hPa ± 10 hPa  
Received Date : 18 January 2022  
Calibrated Date : 21 January 2022  
Calibration Procedure : In-house method CP-SLM-01 based on IEC 61672-3 : 2013 Electroacoustics - Sound level meters - Part 3: Portable tests  
Location of Calibration : Lab Acoustic  
Reference Standard :  
Microphone Class : 2  
Microphone Model : 375A04  
Microphone S/N : 129961  
Pre-amplifier Model : PRMLxT2C  
Pre-amplifier S/N : 025810  
Instrument Status : Used

Instrument	Brand	Model	S/N	Due calibration	Traceability
Standard Microphone	GRAS	40AN	188373	15 September 2022	GRAS
Multi-frequency Calibrator	Quest	Quest-cal	EFA000234	14 June 2022	TS8
Audio Generator	Stanek	Swan401	131	18 October 2022	WIK Elicare

Note  
The reported uncertainty is based on standard uncertainty multiplied by the Coverage Factor  $k = 2$ , providing a level of confidence approximately 95 %

Calibrated By :

Certificate No : 22-ACT-0134  
Request No : Req-2025-0092

### 1. Indication at the calibration check frequency

UUC Setting	Nominal		Before Adjust		Adjust		UNCERTAINTY	Acceptance Limit (± dB)
	Level	(dB)	UUC	ERR	UUC	ERR		
FAST / A / 37-129								
Calibrator Setting								
1000 Hz 114.00 dB	113.83	(dB)	113.9	-0.05	113.9	0.05	0.30	0.3

Note : Absolute sensitivity was established by the use of Sound Calibrator Brand SVANTEK, Model SV 314, SN.18179

### 2. Self-generated noise, Microphone installed

UUC Setting	Measured	UNCERTAINTY
FAST / 37-129		
UUC Weighting	(dB)	(± dB)
A	27.3	0.10

### 3. Self-generated noise, Microphone replaced by the electrical input signal device

UUC Setting	Measured	UNCERTAINTY
FAST / 37-129		
UUC Weighting	(dB)	(± dB)
A	27.5	0.10
C	27.0	0.10
Z	31.8	0.10

### 4. Acoustic signal test of frequency weightings

UUC Setting	Deviation from various frequency weighting response curve			UNCERTAINTY	Acceptance Limit (± dB)
	A	C	Z		
FAST / 37-129					
STD Weighting	(dB)	(dB)	(dB)	(± dB)	(± dB)
125 Hz	0.0	0.1	0.0	0.50	2.0
1000 Hz	0.0	0.0	0.0	0.60	1.0
4000 Hz	0.2	0.3	0.2	0.60	3.0
8000 Hz	-0.3	-0.3	-0.2	0.70	5.0

Certificate No : 25-ACT-034  
Request No : Req-2022-0092

Certificate No : 25-ACT-034  
Request No : Req-2022-0092

5. Electrical signal test of frequency weighting network response with relative to 1 kHz

UUC Setting	Decision from curves Frequency				Acceptance Limit (± dB)
	FAST / 37-139	Weighting Response	UUC	ERR	
STD Setting					
63 Hz	-0.2	-0.1	0.0	0.0	2.0
125 Hz	-0.1	0.0	0.0	0.0	1.5
250 Hz	-0.1	0.0	0.0	0.0	1.5
500 Hz	-0.1	0.0	0.0	0.0	1.5
1000 Hz	0.0	0.0	0.0	0.0	1.0
2000 Hz	0.0	0.0	0.0	0.0	2.0
4000 Hz	0.0	0.0	0.0	0.0	3.0
8000 Hz	-0.1	-0.1	0.0	0.0	5
16000 Hz	-0.1	-0.1	-0.1	-0.1	+5, -4dB

5. Frequency and time weighting at 1 kHz

UUC Setting	Decision from curves Frequency				Acceptance Limit (± dB)
	FAST / 37-139	Weighting Response	UUC	ERR	
STD Setting					
63 Hz	-0.2	-0.1	0.0	0.0	2.0
125 Hz	-0.1	0.0	0.0	0.0	1.5
250 Hz	-0.1	0.0	0.0	0.0	1.5
500 Hz	-0.1	0.0	0.0	0.0	1.5
1000 Hz	0.0	0.0	0.0	0.0	1.0
2000 Hz	0.0	0.0	0.0	0.0	2.0
4000 Hz	0.0	0.0	0.0	0.0	3.0
8000 Hz	-0.1	-0.1	0.0	0.0	5
16000 Hz	-0.1	-0.1	-0.1	-0.1	+5, -4dB

Certificate No	22-ACF-014
Request No	REQ-2022-009

Coefficient No	22-ACT-034
Request No	Req-2022-0099

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

UUC Setting	NTD REF	Measured		UNCERTAINTY (± dB)	Acceptance Limit (± dB)
		UUC (dB)	ERR (dB)		
FAST / A	(43)				
UUC Range		42.8	-43.0	0.2	± 1
37-139	114		114.0	0.0	± 1

## 10. Tone burst response

WUC Setting	STP Timeout (ms)	Anti-Spoof RUC (dB)	Measured		UNCERTAINTY ( $\pm 40\%$ )	Acceptance Limit ( $\pm 40\%$ )
			UUC (dB)	EAR (dB)		
Fast	200	125.0	135.0	0.0		↑
	2	118.0	117.7	-0.3		+1.0, -2.5
	0.25	109.0	108.8	-0.2		+0.5, -5.0
Slow	200	128.6	129.5	-0.9	0.3	↑
	2	109.0	108.9	-0.1		+1.0, -5.0
	200	129.0	128.0	0.0		↑
SEL	2	109.8	109.1	-0.7		+1.0, -2.5
	0.25	100.0	100.0	0.0		+1.5, -5.0

## 21. Peak C sound level

UVC Sorting FAST / C / 93-143	Assigned REP	Measured		UNCERTAINTY (± dB)	Acceptance Limit (± dB)
		UVC (dB)	REP (dB)		
STD Section	64RF	137.4	-0.49		3.0
Complete cycle		136.6	-0.39	0.2	2.0
Positive half cycle	136.4	136.1	-0.20		2.0
Negative half cycle	136.4	136.2	-0.20		2.0

**End of Certificate**

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## Calibration Certificate

**Equipment :** SOUND LEVEL METER  
**Manufacturer :** LARSON DAVIS  
**Model :** LxT2 Microphone 375B02 / Pre-amplifier PRML x T2B  
**Serial No.:** 0005286 / 011740 / 056087  
**ID No.:** -

**Condition As Found :** GOOD  
**Customer :** UNITED ANALYST AND ENGINEERING CONSULTANT (UAE)  
 81 SOI UDOMSUK 41, SUKHUMVIT ROAD,  
 BANGCHAK SUB-DISTRICT,  
 PHRAKHAMONG DISTRICT, BANGKOK 10260  
 THAILAND.

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

**Received Date :** 18 JANUARY 2022  
**Calibration Date :** 26 JANUARY 2022  
**Date of Issue :** 28 JANUARY 2022

**Calibrated by :** Nathakorn Pisulpoisen

**Approved by :**

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.

**Calibration Procedure :** CP-AC-02

### Calibration Method :

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

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

### Condition of this result of calibration :

1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33210A	MY48017076	EF-0012-21	10-Feb-22
Waveform Generator	33511B	MY52302742	EF-0011-21	10-Feb-22
Digital Multimeter	33461A	MY53220104	EEL-BP_050264	10-Feb-22
Digital Multimeter	33461A	MY53220076	EEL-BP_030264	08-Feb-22
Digital Multimeter	34461A	MY60024273	I-15180725251-1	15-Sep-22
Programmable Attenuator	MAT-1070	62100114	1500-07774E	08-Mar-22
Condenser Microphone	4180	2977900	AA-1008-21	05-Feb-22
Measuring Amplifier	NA-42KA1	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 traceable to the international system of units maintained at :

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

Continuation of Calibration Certificate

Cert. No. : ACL22081  
Job No. : VC66AC0044  
Pages : 3 of 8

Summary of Measurement Result :

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

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Continuation of Calibration Certificate

Cert. No. : ACL22081  
Job No. : VC66AC0044  
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)	94.0	0.0	±0.3

2. Self-generated noise

2.1 Normal test

Measured Value (dB )
31.0

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

Frequency Weighting	Measured value (dB )
A - weight	30.8
C - weight	30.6
Flat	30.8

3. Acoustical signal tests of frequency weightings

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

Frequency (Hz )	Deviation from various frequency weighting response curve (dB)		
	Flat	C-weight	A-weight
125	-0.1	0.1	0.0
1000	-0.2	-0.2	-0.2
8000	3.1	3.2	3.2
			Acceptance Limits
			± 1.5
			± 1.0
			± 5.0

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Continuation of Calibration Certificate

Cert. No. : ACL22081  
Job No. : VC65AC0844  
Pages : 5 of 8

4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)		
	Flat	C-weight	A-weight
63	0.0	0.0	0.0
125	0.0	0.0	0.0
250	0.0	0.0	0.0
500	0.0	0.0	0.0
1000	0.0	0.0	0.0
2000	0.0	0.1	0.0
4000	0.0	0.0	0.0
8000	0.0	0.0	0.0
16000	-0.1	0.0	0.1

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
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

Continuation of Calibration Certificate

Cert. No. : ACL22081  
Job No. : VC65AC0844  
Pages : 6 of 8

7. Level linearity on the reference level range

Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
135.0	135.1	0.1	±1.1
134.0	134.1	0.1	±1.1
133.0	133.1	0.1	±1.1
132.0	132.1	0.1	±1.1
131.0	131.1	0.1	±1.1
129.0	129.1	0.1	±1.1
124.0	124.1	0.1	±1.1
119.0	119.1	0.1	±1.1
114.0	114.1	0.1	±1.1
109.0	109.1	0.1	±1.1
104.0	104.1	0.1	±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	49.1	0.1	±1.1
44.0	44.2	0.2	±1.1
39.0	39.6	0.6	±1.1

Continuation of Calibration Certificate

Cert. No. : ACL22081  
Job No. : VC65AC0044  
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)
140	94.0	94.0	0.0	±0.5

9. Tone burst response

Time Weighting	Tone 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	107.8	-0.2	1.5 ; -5.0
	2	8	117.0	116.7	-0.3	1.0 ; -2.5
	200	800	134.0	133.9	-0.1	±1.0
Slow	2	8	108.0	107.8	-0.2	1.5 ; -5.0
	200	800	127.6	127.5	-0.1	±1.0
SEL	0.25	1	N/A	N/A	N/A	1.5 ; -5.0
	2	8	N/A	N/A	N/A	1.0 ; -2.5
	200	800	N/A	N/A	N/A	±1.0

10. Peak C sound level

Number of cycle in test 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	135.7	-0.7	±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	135.2	-0.2	±2.0
Negative half cycle	135.4	135.2	-0.2	±2.0

Continuation of Calibration Certificate

Cert. No. : ACL22081  
Job No. : VC65AC0044  
Pages : 8 of 8

11. Overload indication

Measured value (dB)		Deviated Value (dB)	Acceptance Limits (dB)
Positive one-half cycle	Negative one-half cycle	0.2	±1.5
89.2	89.4		

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 n 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

Customer : UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.  
Name : 81 Soi Ubonrak 41, Subhavit Road, Bangkok, Prachin, Bangkok  
Address : 10260  
Certificate No : 22-ACT-104  
Request No : Req-2022-0232

#### Unit Under Calibration Details

Measurement Item : Sound Level Meter  
Manufacturer : LARSON DAVIS  
Model : LXT2  
Serial Number : 0006614  
ID : UAE EFM0452564  
Resolution : 0.1 dB  
Microphone Class : 2  
Microphone Model : 375A04  
Microphone SN : 379353  
Preamplifier Model : PRML172C  
Preamplifier SN : 071534  
Instrument Status : Used

#### Calibration Environment and Details

Temperature : 23 °C ± 2 °C  
Humidity : 50 %RH ± 20 %RH  
Barometric Pressure : 1013 hPa ± 10 hPa  
Received Date : 31 January 2022  
Calibrated Date : 11 February 2022  
Calibration Procedure : In-house method (7-SLM-01) based on IEC 61672-3 : 2013 Electroacoustics - Sound level meters - Part 3: Periodic tests  
Location of Calibration : Lab Acoustic

#### Reference Standard

Instrument	Brand	Model	S/N	Due calibration	Traceability
Standard Microphone	GRAS	40AN	198273	15 September 2022	GRAS
Multifrequency Calibrator	Quest	Questcal	EFA009234	14 June 2022	ISA
Audio Generator	Sennheiser	Stead04	131	18 October 2022	WKA Electric

#### Note

The reported uncertainty is based on standard uncertainty multiplied by the Coverage Factor  $k = 2$ , providing a level of confidence approximately 95 %

Calibrated By :

The results related only to the items calibrated. The certificate shall not be reproduced except in full, without written approval of the Innovative Instrument Co., Ltd.  
EN-208-SLA-01 Rev.0 Issue date 01/07/11

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Certificate No : 22-ACT-104  
Request No : Req-2022-0232

#### 1. Indication at the calibration check frequency

UUC Setting	Nominal	Before Adjust		Adjust		Acceptance Limit (± dB)
		UUC (dB)	ERR (dB)	UUC (dB)	ERR (dB)	
FAST / 37-139	Level					
Calibrator Setting	(dB)					
1000 Hz 114.00 dB	113.85	114.0	+0.15	113.9	0.05	0.3

Note : Absolute sensitivity was established by the use of Sound Calibrator Brand SVANTEK, Model SV 35A, SN.58079

#### 2. Self-generated noise, Microphone installed

UUC Setting	Measured	UNCERTAINTY
FAST / 37-139	(dB)	(± dB)
UUC Weighting		
A	28.7	0.10

#### 3. Self-generated noise, Microphone replaced by the electrical input signal device

UUC Setting	Measured	UNCERTAINTY
FAST / 37-139	(dB)	(± dB)
UUC Weighting		
A	28.5	0.10
C	28.8	0.10
Z	34.7	0.10

#### 4. Acoustic signal test of frequency weightings (Without Windscreen)

UUC Setting	Termination from various Frequency			UNCERTAINTY	Acceptance Limit
	Weighting Response curve				
	A	C	Z	(± dB)	(± dB)
FAST / 37-139					
STD Setting	(dB)	(dB)	(dB)		
125 Hz	0.0	0.1	0.1	0.50	2.0
1000 Hz	0.0	0.0	0.0	0.60	1.0
4000 Hz	0.2	0.7	0.7	0.60	3.0
8000 Hz	1.0	0.9	0.8	0.70	5.0

The results related only to the items calibrated. The certificate shall not be reproduced except in full, without written approval of the Innovative Instrument Co., Ltd.  
EN-208-SLA-01 Rev.0 Issue date 01/07/11

เอกสารไม่ควบคุม

5. Electrical signal test of frequency weightings, Weighting network response with relative to 1 kHz

UUC Setting	Deviation from various Frequency Weighting Response curve				Acceptance Limit (± dB)
	A (dB)	C (dB)	Z (dB)	UNCERTAINTY (± dB)	
FAST / 37-139					
STD Setting					
63 Hz	-0.2	0.0	0.0		2.0
125 Hz	-0.1	0.0	0.0		1.5
250 Hz	-0.1	0.0	0.0		1.5
500 Hz	-0.1	0.0	0.0		1.5
1000 Hz	0.0	0.0	0.0	0.2	1.0
2000 Hz	0.0	0.1	0.0		2.0
4000 Hz	0.0	0.0	0.0		3.0
8000 Hz	0.0	0.0	0.0		5.0
16000 Hz	-0.1	-0.1	-0.1		+4, -10dB

6. Frequency and time weightings at 1kHz

UUC Setting	Measured				Acceptance Limit (± dB)
	STD	REF	UUC	ERR	
FAST / 37-139					
UUC Weighting					
A	114.00	114.00	114.0	0.0	0.2
C	114.00	114.00	114.0	0.0	0.2
Z	114.00	114.00	114.0	0.0	0.2

UUC Setting	Measured				Acceptance Limit (± dB)
	STD	REF	UUC	ERR	
72-139 / A					
UUC Time Response					
Fast	114.00	114.00	114.0	0.0	0.1
Slow	114.00	114.00	114.0	0.0	0.1
Leq	114.00	114.00	114.0	0.0	0.1

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the Innovative Instrument Co., Ltd.  
P24-705-SC14-01 Rev-0 Issue date 03/07/21

เอกสารไม่ควบคุม

7. Long Term Stability

UUC Setting	Measured		UNCERTAINTY (± dB)	Acceptance Limit (± dB)
	FAST / A / 37-139	UUC (dB)		
STD Setting				
Initial		114.0		
Final		114.0		
Deviated		0.0	0.1	0.3

8. Level linearity on the reference level range

UUC Setting	Amplified REF (dB)	Deviation		UNCERTAINTY (± dB)	Acceptance Limit (± dB)
		UUC (dB)	ERR (dB)		
FAST / A / 37-139					
STD dB					
140.00	140	140.0	0.0		1.1
139.00	139	139.0	0.0		1.1
138.00	138	138.0	0.0		1.1
129.00	129	129.0	0.0		1.1
128.00	128	128.0	0.0		1.1
119.00	119	119.0	0.0		1.1
118.00	118	118.0	0.0		1.1
109.00	109	109.0	0.0		1.1
108.00	108	108.0	0.0		1.1
99.00	99	99.0	0.0		1.1
98.00	98	98.0	0.0		1.1
89.00	89	89.0	0.0		1.1
88.00	88	88.0	0.0		1.1
79.00	79	79.0	0.0		1.1
78.00	78	78.0	0.0		1.1
69.00	69	69.0	0.0		1.1
68.00	68	68.0	0.0		1.1
59.00	59	59.0	0.0		1.1
58.00	58	58.0	0.0		1.1
49.00	49	49.0	0.0		1.1
48.00	48	48.0	0.1		1.1
39.00	39	39.0	0.3		1.1

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the Innovative Instrument Co., Ltd.  
P24-705-SC14-01 Rev-0 Issue date 01/07/21

เอกสารไม่ควบคุม

Certificate No	22-ACCT-104
Request No	Req-2022-0232

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

UUC Setting	STD REF	Measured		UNCERTAINTY (± dB)	Acceptance Limit (± dB)
		UUC (dB)	ERR (dB)		
FAST / A	IdB	44.1	-0.4	0.3	1.1
	UUC Range	114	0.0		
37-139					1.1

## 10. Tone burst response

UUC Setting	STD Toneburst [ms]	Amplified Ref [dB]	Measured		UNCERTAINTY (±dB)	Acceptance Limit (±dB)
			UUC [dB]	EAR [dB]		
Fast	200	135.0	135.0	0.0		1.0
	2	118.8	117.9	-0.1		+1.0, -2.5
	0.25	109.0	109.7	-0.3		+1.5, -5.0
Slow	200	128.6	128.5	-0.1	0.3	1.0
	2	109.0	108.8	-0.2		+1.0, -5.0
	200	129.0	129.0	0.0		1.0
SEL	2	109.0	109.1	+0.1		+1.0, -2.5
	0.25	106.0	99.7	-0.3		+1.5, -5.0

## 11. Peak C Sound level

TEST TYPE	TEST SETTING	ANTICIPATED REP	MEASURED		UNCERTAINTY ( $\pm$ dB)	ACCEPTANCE LIMIT ( $\pm$ dB)
			UUC (dB)	ERR (dB)		
FAST FC 95-142	STD Setting	137.4	136.7	-0.70	0.2	3.0
	Complete cycle	136.4	136.3	-0.20		2.0
	Positive half cycle	136.4	136.2	-0.20		2.0

The results related only to the fees collected. The certificate shall not be rendered except in full without written approval of the Innovative Insurance Co. Ltd.

File #202-514-00, Rev'd June 20, 2011

## เอกสารไม่ควบคุม

The results released only to the news collected. The certificate shall not be reproduced except in full, without written approval of the Issuance instrument C.O. 1

## เอกสารไม่ควบคุม

Certificate No	22-ACT-104
Request No	Req-2022-0212

## 12. Overload indication

UUC Setting	Measured	(UNCERTAINTY	Acceptance
FAST / A / 37-139	UUC	(± dB)	L <sub>dB</sub> IT
STD Setting	(dB)		( ± dB)
Positive one-half cycle	142.7		
Negative one-half cycle	142.6		
Deviated	0.1	0.2	1.5

### 13. High Level Stability

UUC Setting	Measured	UNCERTAINTY	Acceptance Limit
FAST / A / 37-39	UUC	[ $\pm 0.6$ ]	0.3
STD Setting	(40)		
Initial	138.0		
Final	138.0		
Derived	0.0	0.1	0.3

**End of Certificate**

### Certificate of Calibration

Customer : UNITED ANALYST AND ENGINEERING CONSULTANT CO.LTD.  
Name : 81 Sukhumvit #1, Sukhumvit Road, Bangkok, Prachinang, Bangkok  
Address : 10260  
Request No : Req-2022-0234  
Certificate No : 22-ACT-105

Unit Under Calibration Details  
Measurement Item : Sound Level Meter  
Manufacturer : LARSON DAVIS  
Model : LxT2  
Serial Number : 0005396  
ID : UAE.EFM.032164  
Resolution : 0.1 dB  
Calibration Environment and Details  
Temperature : 23 °C ± 2 °C  
Humidity : 50 %RH ± 20 %RH  
Barometric Pressure : 1013 hPa ± 10 hPa  
Received Date : 31 January 2022  
Calibrated Date : 11 February 2022  
Calibration Procedure : In-house method CP-SLM-018 based on IEC 61672-1 : 2013 Electroacoustics - Sound level meters - Part 1: Periodic tests  
Location of Calibration : Lab Acoustic  
Reference Standard : Lab Acoustic

Microphone Class : 2  
Microphone Model : 375A04  
Microphone SN : 378340  
Preamplifier Model : PRLM12TC  
Preamplifier SN : 073812  
Instrument Status : Used

Instrument	Brand	Model	SN.	Date calibration	Traceability
Standard Microphone	GRAS	40AN	FR8273	15 September 2022	GRAS
Multi-frequency Calibrator	Quest	Questcal	EFA000234	14 June 2023	TN
Audio Generator	Svanick	Svan401	131	18 October 2022	WK Electric

#### Note

The reported uncertainty is based on standard uncertainty multiplied by the Coverage Factor k = 2, providing a level of confidence approximately 95 %.

Calibrated By :



The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the Innovative Instrument Co., Ltd.  
PM-298-01-01 Rev.01 Issue date 01/07/19

เอกสารไม่ควบคุม

Certificate No : 22-ACT-105  
Request No : Req-2022-0229

#### 1. Indication at the calibration check frequency

UUC Setting	Nominal Level (dB)	Before Adjust		Adjust		UNCERTAINTY (± dB)	Acceptance Limit (± dB)
		UUC (dB)	ERR (dB)	UUC (dB)	ERR (dB)		
FAST/37-139							
Calibrator Setting							
1000 Hz 114.00 dB	113.55	113.9	40.05	113.9	0.05	0.20	0.3

Note : Absolute sensitivity was established by the use of Sennheiser Calibrator Brand SVANTEK Model SV 35A, SN:58079

#### 2. Self-generated noise, Microphone Installed

UUC Setting	Measured (dB)	UNCERTAINTY (± dB)
FAST/37-139		
UUC Weighting		
A	27.8	0.10

#### 3. Self-generated noise, Microphone replaced by the electrical input signal device

UUC Setting	Measured (dB)	UNCERTAINTY (± dB)
FAST/37-139		
UUC Weighting		
A	27.8	0.10
C	27.3	0.10
Z	13.1	0.10

#### 4. Acoustic signal test of frequency weightings (Without Windscreen)

UUC Setting	Deviation from various Frequency Weighting Response curve	UNCERTAINTY (± dB)		Acceptance Limit (± dB)
		A	Z	
FAST/37-139				
STD Setting				
125 Hz	0.1	0.1	0.2	2.0
1000 Hz	0.0	0.0	0.0	1.0
4000 Hz	0.6	0.5	0.6	3.0
8000 Hz	0.1	0.0	0.2	3.0

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PM-298-01-01 Rev.01 Issue date 01/07/19

เอกสารไม่ควบคุม



Certificate No : 22-ACT-103  
Request No : Req-2022-0229

S. Electrical signal test of frequency weightings, Weighting network response with relative to 1 kHz	UUC Setting	Deviation from various Frequency				UNCERTAINTY ( ± dB)	Acceptance Limit ( ± dB)
		Weighting Response curve					
		A (dB)	C (dB)	Z (dB)			
	FAST / 37-139						
	STD Setting						
	63 Hz	-0.2	0.0	0.0	0.0	0.0	2.0
	125 Hz	-0.1	0.0	0.0	0.0	0.0	1.5
	250 Hz	-0.1	0.0	0.0	0.0	0.0	1.5
	500 Hz	-0.1	0.0	0.0	0.0	0.0	1.5
	1000 Hz	0.0	0.0	0.0	0.0	0.0	1.0
	2000 Hz	0.0	0.1	0.0	0.0	0.0	2.0
	4000 Hz	0.0	0.0	0.0	0.0	0.0	3.0
	8000 Hz	0.0	0.0	0.0	0.0	0.0	5.0
	16000 Hz	-0.1	-0.1	-0.1	-0.1	-0.1	-0.5, -INF.

5. Electrical signal test of frequency weightings. Weighting network response with relative to 1 kHz

UUC Setting	STD	Measured		UNCERTAINTY { ± dB}	Acceptance Limit { ± dB}
		UUC	ERR		
		(dB)	(dB)		
FAST / 37-139					
UVC Weighting					
A	114.00	114.0	0.0	0.2	0.2
C	114.00	114.0	0.0		0.2
Z	114.00	114.0	0.0		0.2

UUC Setting		STD	Measured		UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
			WRF (dB)	UUC (dB)		
37-139 / A						
UUC Time Response						
Fast		114.00	114.0	0.0		0.1
Slow		114.00	114.0	0.0	0.2	0.1
Leq		114.00	114.0	0.0		0.1

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Fax: 069-2116-7140 E-mail: info@innovative.co.th

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Certificate No : 22-ACT-103  
Request No : Req-2022-0229

7. Long Term Stability			Measured	UNCERTAINTY  ( $\pm$ dB)	Acceptance Limit  ( $\pm$ dB)
UUC Setting		UUC			
FAST / A / 37-139		UUC			
STD Setting		(dB)			
Initial		114.0			
Final		114.0			
Deviated		0.0		0.1	0.3

7. Long Term Stability

UUC Setting		Anticipated		Deviation		UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
	FAST / A / 37-139	REF (dB)	UUC (dB)	ERR (dB)			
	STD dB						
	139.00	139	139.0	0.0			1.1
	134.00	134	134.0	0.0			1.1
	129.00	129	129.0	0.0			1.1
	124.00	124	124.0	0.0			1.1
	119.00	119	119.0	0.0			1.1
	114.00	114	114.0	0.0			1.1
	109.00	109	109.0	0.0			1.1
	104.00	104	104.0	0.0			1.1
	99.00	99	99.0	0.0			1.1
	94.00	94	93.9	-0.1			1.1
	89.00	89	88.9	-0.1		0.3	1.1
	84.00	84	83.9	-0.1			1.1
	79.00	79	78.9	-0.1			1.1
	74.00	74	73.9	-0.1			1.1
	69.00	69	68.9	-0.1			1.1
	64.00	64	63.9	-0.1			1.1
	59.00	59	58.9	-0.1			1.1
	54.00	54	53.9	-0.1			1.1
	49.00	49	48.9	-0.1			1.1
	44.00	44	44.0	0.0			1.1
	39.00	39	39.2	0.2			1.1
	34.00	34	34.3	0.3			1.1

8. Level linearity on the reference level range

UUC Setting		Anticipated		Deviation		UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
	FAST / A / 37-139	REF (dB)	UUC (dB)	ERR (dB)			
	STD dB						
	139.00	139	139.0	0.0			1.1
	134.00	134	134.0	0.0			1.1
	129.00	129	129.0	0.0			1.1
	124.00	124	124.0	0.0			1.1
	119.00	119	119.0	0.0			1.1
	114.00	114	114.0	0.0			1.1
	109.00	109	109.0	0.0			1.1
	104.00	104	104.0	0.0			1.1
	99.00	99	99.0	0.0			1.1
	94.00	94	93.9	-0.1			1.1
	89.00	89	88.9	-0.1		0.3	1.1
	84.00	84	83.9	-0.1			1.1
	79.00	79	78.9	-0.1			1.1
	74.00	74	73.9	-0.1			1.1
	69.00	69	68.9	-0.1			1.1
	64.00	64	63.9	-0.1			1.1
	59.00	59	58.9	-0.1			1.1
	54.00	54	53.9	-0.1			1.1
	49.00	49	48.9	-0.1			1.1
	44.00	44	44.0	0.0			1.1
	39.00	39	39.2	0.2			1.1
	34.00	34	34.3	0.3			1.1

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Certificate No : 22-ACT-105  
Request No : Req-2022-0229

9. Level linearity including the level range control

UUC Setting	STD REF (dB)	Measured		UNCERTAINTY (± dB)	Acceptance Limit (± dB)
		UUC (dB)	ERR (dB)		
FAST ± A	43.2	42.8	-0.4	0.3	1.1
	114	114.0	0.0		

10. Tone burst response

UUC Setting	STD Tones (ms)	Anticipated Ref (dB)	Measured		UNCERTAINTY (± dB)	Acceptance Limit (± dB)
			UUC (dB)	ERR (dB)		
UUC Time Response	200	135.0	134.9	-0.1	0.3	1.0
	2	118.0	117.5	-0.4		
	0.25	105.0	105.7	-0.3		
	200	126.6	126.3	-0.1		
Slow	2	109.0	108.9	-0.1	0.3	1.0
	200	129.0	129.0	0.0		
	2	109.0	108.9	-0.1		
SRL	0.25	100.0	100.0	0.0	0.3	1.0
	2	109.0	108.9	-0.1		

11. Peak C Sound level

UUC Setting	Anticipated REF (dB)	Measured		UNCERTAINTY (± dB)	Acceptance Limit (± dB)
		UUC (dB)	ERR (dB)		
FAST / C / 95-142	117.4	116.7	-0.70	0.2	3.0
	136.4	136.2	-0.20		
	136.4	136.2	-0.20		
	136.4	136.2	-0.20		

The meter related only in the item calibrated. The certificate shall not be reproduced except in full, without written approval of the Innovative Instrument Co., Ltd.  
PM-708-SLA-01 Rev.0 Issue Date 01/07/19

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Certificate No : 22-ACT-105  
Request No : Req-2022-0229

12. Overload indication

UUC Setting	Measured	UNCERTAINTY (± dB)	Acceptance Limit (± dB)
FAST / A / 37-139	UUC (dB)	0.2	1.5
STD Setting	141.7		
Positive one-half cycle	141.8		
Negative one-half cycle	-0.1		

13. High Level Stability

UUC Setting	Measured	UNCERTAINTY (± dB)	Acceptance Limit (± dB)
FAST / A / 37-139	UUC (dB)	0.1	0.3
STD Setting	138.0		
Initial	138.0		
Final	0.0		

End of Certificate

The meter related only in the item calibrated. The certificate shall not be reproduced except in full, without written approval of the Innovative Instrument Co., Ltd.  
PM-708-SLA-01 Rev.0 Issue Date 01/07/19

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TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)  
CORPORATE SERVICES & EQUIPMENT CALIBRATION AND TESTING SERVICES  
534/4 PATTANAKARN ROAD SOI 18, SUANLIANG, SUANLIANG BANGKOK 10250  
TEL. 0-2717-3004-27 FAX. 0-2719-9484

Cert.No.: 21CH1607  
Page.: 1 of 3

## Certificate of Calibration

Equipment : pH Meter  
Manufacturer : Horiba  
Model : LAQUA-PH210  
Serial No. : HA1F0002  
ID No. : UAE-EFM.20072584(EFM.pH.08/64)  
Condition As-Received : Used Item  
Received Date : 18 November 2021  
Calibration Date : 19 November 2021  
Reference : 2111-0738WSC-1  
Submitted by : United Analyst and Engineering Consultant Co., Ltd.  
3 Soi Udomsuk 41, Sukhumvit Road,  
Bongkok, Phrakhanong, Bangkok 10260  
(25 ± 2.5) °C  
(50 ± 15) %  
In - house method :  
- CP-CH5 by direct measurement with standard  
voltage calibrator and direct measurement with  
certified reference material (CRM)  
- CP-CH8 by comparison with standard thermometer

Calibrated by :

Warakorn Lemgagrakul

Approved by :

(/ ) Malee Butruera  
( ) Saithep Meangmai  
( ) Warakorn Lemgagrakul

Issue Date :

25 November 2021

The Uncertainties are for a confidence probability of approximately 95%

This certificate may not be reproduced other than in full, except with the prior written  
Approval of the head of Corporate Services & Equipment Calibration and Testing Services.

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Cert.No.: 21CH1607  
Page.: 2 of 3

### Condition of this calibration result

1. Reference Standard Instrument : -  
Serial No. ID No. Cert. No. Due Date  
1) Document Process Calibrator 54030049 130RC116 21E2662 25 Aug 2022  
2) Ref. Standard Thermometer 4982054 110RC044 2111201 26 Oct 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 : The measurement results are traceable to SI through CPA Chem Ltd.,  
ANSI-ASQ National Accreditation Board, Accredited No. AR-1835

Buffer Solution Manufacturer Lot No. Exp. date  
pH 4.008 CPA chem 761016 02 Aug 2023  
pH 6.862 CPA chem 761017 02 Aug 2022  
pH 10.015 CPA chem 761018 02 Aug 2022

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

### Calibration Results

Function : mV Measurement

Performing standard curve by Fluke at pH (4.7/7.10)

Unit Under Calibration	Nominal Value	Standard Voltage Input	Actual Reading		Uncertainty of Measurement (mV)	Coverage factor k
			mV	pH		
pH Meter SN: HA1F0002	pH 4.00	177.48	177.4	4.01	0.058	2.00
	7.00	0.00	-0.2	7.02	0.058	2.00
	10.00	-177.48	-177.6	10.01	0.058	2.00

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Cert.No.: 21CH1807

Page.: 3 of 3

#### Calibration Results

Function : pH Measurement

Performing three buffers standard curve by using buffer nominal pH (4,7)(7,10)

Unit Under Calibration	Standard pH Buffer Solution	Actual pH Reading	Actual mV Reading (mV)	Uncertainty of pH measurement ( $\pm$ )	Coverage factor k
pH Electrode SN.: 991E0471	4.008	4.01	172	0.0071	2.00
	6.982	6.98	-4	0.011	2.00
	6.982	6.98	-4	0.011	2.00
	10.015	10.01	-181	0.011	2.05

Function : Temperature Measurement

(\*) Without adjustment

This equipment was connected with Temperature Probe:

- Model : 9652

- Serial No. : 991E0471

Dimension of probe:

- Length : 103 mm.

- Diameter : 16 mm.

- Immersion Depth : 90 mm.

Calibration Point (°C)	Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	Uncertainty of measurement ( $\pm$ °C)	Coverage factor k
25.0	25.002	25.0	-0.002	0.13	2.00
30.0	30.004	30.0	-0.004	0.13	2.00
35.0	35.003	35.0	-0.003	0.13	2.00

Remark :- UUC\* = Unit Under Calibration

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

-o0o-

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INNOVATIVE INSTRUMENT CALIBRATION LAB  
INNOVATIVE INSTRUMENT CO., LTD. HEAD OFFICE  
\* 133 Moo 11, Km 15 (Srinakorn 11) Chaeng Bang Road,  
Amphur Bang Pakong, Prachin Buri Province 30150 Thailand  
TEL : 099-2116496-1 FAX: 099-2116497



ANAB  
ASSOCIATION OF NATIONAL ACCREDITATION BODIES  
A C C R  
CALIBRATION LABORATORY

Page 1 of 2

#### Certificate of Calibration

##### Customer

Name : UNITED ANALYST AND ENGINEERING

CONSULTANT CO., LTD.

Address : 81 Soi Mahavithai 41, Sukhumvit Road, Bangkok, Prachin Buri

Bangkok 10350

Certificate No. : 21-ACT-187

Request No. : Req-2021-0523

##### Unit Under Calibration Details

Measurement Item : Acoustic Calibrator

Manufacturer : SVANTEK

Model : SV 35A

Serial Number : 73249

ID : UAE.EPM.1052361

Class : I

Range : 94 - 148 dB (100 Hz)

Instrument Status : Used

##### Calibration Environment and Details

Temperature : (23  $\pm$  2 °C)

Humidity : (50  $\pm$  20 %RH)

Barometric Pressure : (1013  $\pm$  0.0 hPa)

Received Date : 27 April 2021

Calibration Date : 28 May 2021

Location of Calibration : LAB 1 Acoustic

Calibration Procedure : In-house method CP-ACT-02 based on IEC 60942:2017 Electroacoustics - Sound calibrators

##### Reference Standard

Sound Calibrator Model : SV 35A

THD Multimeter Model : 2015

##### Traceability

Serial Number : 58079

Traceable : EEA

Due Calibration : 14 May 2022

Next Calibration : 22 January 2022

##### Note

This certificate provides traceability of measurement to recognised national standard, and to the realization of the International System of Units (SI).

##### Note

The reported uncertainty is based on standard uncertainty multiplied by the Coverage Factor k=2, providing a level of confidence approximately 95 %.

##### Calibrated By :

The results stated only on the item calibrated. The certificate shall not be reproduced except in full, without written approval of the issuing body.  
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Measuring instrument:	Sound Level Meter
Manufacturer:	RION
Model:	NL-42
Serial Number:	80409058
Microphone Class.: 2	Microphone Class.: 1
Microphone Model:	ILC-52
Microphone SN:	189687
Preampifier Model:	N11-24
Preampifier SN:	90495

Resolution	0.1 dB
Calibration Environment and Details	
Temperature	23 °C ± 2 °C
Humidity	50 %RH ± 20 %RH
Barometric Pressure	1013 hPa ± 10 hPa
Measured Date	31 January 2022
Calibrated Date	3 February 2022

Calligraphic Procedure  
 In-house method CIP-534-01 based on IEC 61672-3 2013 Electroacoustics - Sound level meters - Part 3: Permittive tests  
 Tech Acoustic  
 Revision of Calibration

#### Reference Standard

Instrument	Brand	Model	S/N	Date calibration	Traceability
Standard Microphone	GRAS	40AN	182372	13 September 2022	GRAS
Multifrequency Calibrator	Qson	Qson-cal	EPFA000324	14 June 2022	TSI
Audio Generator	Synsco	Stead-01	131	18 October 2022	WV Electric

**Public**

The reported underality is based on standard uncertainty multiplied by the Coverage Factor  $k = 2$ , providing a level of confidence approximately 95 %.

**Continued**

## Calibration Results: Without Adjustment

Sound pressure level	Calibration Range (dB)	Calibration Results : Without Adjustment					
		Without Adjustment (dB)		Adjustment (dB)		Uncertainty (±dB)	Acceptance Limit Class 1 (±dB)
		Measured	Error	Measured	Error		
94 dB / 1000 Hz		93.81	-0.19	-	-	0.11	0.25
114 dB / 1000 Hz		113.83	-0.17	-	-	0.11	0.25

## Frequency of Sound pressure level

Calibration Range (Hz)	Without Adjustment		Adjustment		Uncertainty ( $\pm$ %)	Acceptance limit Class A ( $\pm$ %)
	Measured (Hz)	Error (%)	Measured (Hz)	Error (%)		
94 dB / 1000 Hz	999.97	0.003	-	-	0.02	0.70
114 dB / 1000 Hz	999.98	0.002	-	-	0.02	0.70

## Total Harmonic Distortion plus Noise of Sound pressure level (THD+N %)

Calibration Range (Hz)	Without Adjustment		Adjustment Measured (%)	Uncertainty (± %)	Acceptance Limit Class 1 (± %)
	Measured (%)				
94 dB / 1000 Hz	0.18		-	0.17	2.5
114 dB / 1000 Hz	0.04		-	0.17	2.5

**NAME:**

- Acceptance limit:  $\leq 165,000/2,2817$  Class 1
- The oven then results exclude the calorimeter pressure electrode
- The oven then results exclude the microbalance volume correction

## End of Calibration



Certificate No : 22-AC-1465  
Request No : RCP-2022-0223

1. Indication at the calibration check frequency

UNC Setting	Measured Level (dB)	Setpoint Adjust (dB)	Adjust UVC (dB)	ERR (dB)	UNCERTAINTY (± dB)	Acceptance Limit (± dB)
FAST / 25 - 138	91.95	-0.05	91.9	-0.05	0.20	0.1

Note : Acoustic sensitivity was established by the use of Sound Calibrator Brand Smaart, Model SV 35A, SN: 58079

2. Self-generated noise, Microphone installed

UNC Setting	Measured Level (dB)	UNCERTAINTY (± dB)
FAST / 25 - 138	14.3	0.10

3. Self-generated noise, Microphone replaced by the electrical input signal device

UNC Setting	Measured Level (dB)	UNCERTAINTY (± dB)
FAST / 25 - 138	11.3	0.10
UVC Weighting	16.7	0.10
A	22.8	0.10

4. Acoustic signal test of frequency weighting (Without Windscreens)

UNC Setting	Measured Level (dB)	UNCERTAINTY (± dB)	Acceptance Limit (± dB)
FAST / 25 - 138	6.2	0.30	1.5
STD Setting	0.0	0.60	1.0
125 Hz	-0.5	0.60	3.0
1000 Hz	-2.4	0.70	5.0



Certificate No : 22-AC-1467  
Request No : RCP-2022-0223

5. Electrical signal test of frequency weighting, Weighting network response with relative to 1 kHz

UNC Setting	Measured Level (dB)	UNCERTAINTY (± dB)	Acceptance Limit (± dB)
FAST / 25 - 138	-0.2	-0.1	2.0
STD Setting	-0.1	0.0	1.5
63 Hz	-0.1	0.0	1.5
125 Hz	0.0	0.1	1.5
250 Hz	0.0	0.1	1.0
500 Hz	0.0	0.0	2.0
1000 Hz	0.1	0.1	3.0
2000 Hz	-1.3	-1.3	±5, -11dB

6. Frequency and time weighting at 1kHz

UNC Setting	Measured Level (dB)	UNCERTAINTY (± dB)	Acceptance Limit (± dB)
FAST / 25 - 138	94.00	0.0	0.2
UVC Weighting	94.00	0.0	0.2
A	94.00	0.0	0.2
C	94.00	0.0	0.2
Z	94.00	0.0	0.2

UNC Setting	Measured Level (dB)	UNCERTAINTY (± dB)	Acceptance Limit (± dB)
FAST / 25 - 138	94.00	0.0	0.1
STD Setting	94.00	0.0	0.1
125 Hz	94.00	0.0	0.1
250 Hz	94.00	0.0	0.1
500 Hz	94.00	0.0	0.1
1000 Hz	94.00	0.0	0.1
2000 Hz	94.00	0.0	0.1

Certificate No: 22-ACT-007  
Request No: Req-2022-0223

7. Long Term Stability

UUC Setting	Measured	Acceptance	
		UNCERTAINTY ( $\pm$ dB)	Limit ( $\pm$ dB)
FAST / A / 25 - 135	UUC (dB)		
STD Settling			
Initial	94.0		
Final	94.0		
Deviation	0.0	0.1	0.1

8. Level linearity on the reference level range

UUC Setting	Anticipated		Deviation		UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
	RSP (dB)	ERR (dB)	UUC (dB)	ERR (dB)		
FAST / A / 25 - 135						
STD dB						
137.00	137	137.0	0.0	0.0		0.3
136.00	136	136.0	0.0	0.0		0.3
135.00	135	135.0	0.0	0.0		1.1
134.00	134	134.0	0.0	0.0		1.1
133.00	133	133.0	0.0	0.0		1.1
132.00	132	132.0	0.0	0.0		1.1
131.00	131	131.0	0.0	0.0		1.1
130.00	130	130.0	0.0	0.0		1.1
129.00	129	129.0	0.0	0.0		1.1
128.00	128	128.0	0.0	0.0		1.1
127.00	127	127.0	0.0	0.0		1.1
126.00	126	126.0	0.0	0.0		1.1
125.00	125	125.0	0.0	0.0		1.1
124.00	124	124.0	0.0	0.0		1.1
123.00	123	123.0	0.0	0.0		1.1
122.00	122	122.0	0.0	0.0		1.1
121.00	121	121.0	0.0	0.0		1.1
120.00	120	120.0	0.0	0.0		1.1
119.00	119	119.0	0.0	0.0		1.1
118.00	118	118.0	0.0	0.0		1.1
117.00	117	117.0	0.0	0.0		1.1
116.00	116	116.0	0.0	0.0		1.1
115.00	115	115.0	0.0	0.0		1.1
114.00	114	114.0	0.0	0.0		1.1
113.00	113	113.0	0.0	0.0		1.1
112.00	112	112.0	0.0	0.0		1.1
111.00	111	111.0	0.0	0.0		1.1
110.00	110	110.0	0.0	0.0		1.1
109.00	109	109.0	0.0	0.0		1.1
108.00	108	108.0	0.0	0.0		1.1
107.00	107	107.0	0.0	0.0		1.1
106.00	106	106.0	0.0	0.0		1.1
105.00	105	105.0	0.0	0.0		1.1
104.00	104	104.0	0.0	0.0		1.1
103.00	103	103.0	0.0	0.0		1.1
102.00	102	102.0	0.0	0.0		1.1
101.00	101	101.0	0.0	0.0		1.1
100.00	100	100.0	0.0	0.0		1.1
99.00	99	99.0	0.0	0.0		1.1
98.00	98	98.0	0.0	0.0		1.1
97.00	97	97.0	0.0	0.0		1.1
96.00	96	96.0	0.0	0.0		1.1
95.00	95	95.0	0.0	0.0		1.1
94.00	94	94.0	0.0	0.0		1.1
93.00	93	93.0	0.0	0.0		1.1
92.00	92	92.0	0.0	0.0		1.1
91.00	91	91.0	0.0	0.0		1.1
90.00	90	90.0	0.0	0.0		1.1
89.00	89	89.0	0.0	0.0		1.1
88.00	88	88.0	0.0	0.0		1.1
87.00	87	87.0	0.0	0.0		1.1
86.00	86	86.0	0.0	0.0		1.1
85.00	85	85.0	0.0	0.0		1.1
84.00	84	84.0	0.0	0.0		1.1
83.00	83	83.0	0.0	0.0		1.1
82.00	82	82.0	0.0	0.0		1.1
81.00	81	81.0	0.0	0.0		1.1
80.00	80	80.0	0.0	0.0		1.1
79.00	79	79.0	0.0	0.0		1.1
78.00	78	78.0	0.0	0.0		1.1
77.00	77	77.0	0.0	0.0		1.1
76.00	76	76.0	0.0	0.0		1.1
75.00	75	75.0	0.0	0.0		1.1
74.00	74	74.0	0.0	0.0		1.1
73.00	73	73.0	0.0	0.0		1.1
72.00	72	72.0	0.0	0.0		1.1
71.00	71	71.0	0.0	0.0		1.1
70.00	70	70.0	0.0	0.0		1.1
69.00	69	69.0	0.0	0.0		1.1
68.00	68	68.0	0.0	0.0		1.1
67.00	67	67.0	0.0	0.0		1.1
66.00	66	66.0	0.0	0.0		1.1
65.00	65	65.0	0.0	0.0		1.1
64.00	64	64.0	0.0	0.0		1.1
63.00	63	63.0	0.0	0.0		1.1
62.00	62	62.0	0.0	0.0		1.1
61.00	61	61.0	0.0	0.0		1.1
60.00	60	60.0	0.0	0.0		1.1
59.00	59	59.0	0.0	0.0		1.1
58.00	58	58.0	0.0	0.0		1.1
57.00	57	57.0	0.0	0.0		1.1
56.00	56	56.0	0.0	0.0		1.1
55.00	55	55.0	0.0	0.0		1.1
54.00	54	54.0	0.0	0.0		1.1
53.00	53	53.0	0.0	0.0		1.1
52.00	52	52.0	0.0	0.0		1.1
51.00	51	51.0	0.0	0.0		1.1
50.00	50	50.0	0.0	0.0		1.1
49.00	49	49.0	0.0	0.0		1.1
48.00	48	48.0	0.0	0.0		1.1
47.00	47	47.0	0.0	0.0		1.1
46.00	46	46.0	0.0	0.0		1.1
45.00	45	45.0	0.0	0.0		1.1
44.00	44	44.0	0.0	0.0		1.1
43.00	43	43.0	0.0	0.0		1.1
42.00	42	42.0	0.0	0.0		1.1
41.00	41	41.0	0.0	0.0		1.1
40.00	40	40.0	0.0	0.0		1.1
39.00	39	39.0	0.0	0.0		1.1
38.00	38	38.0	0.0	0.0		1.1
37.00	37	37.0	0.0	0.0		1.1
36.00	36	36.0	0.0	0.0		1.1
35.00	35	35.0	0.0	0.0		1.1
34.00	34	34.0	0.0	0.0		1.1
33.00	33	33.0	0.0	0.0		1.1
32.00	32	32.0	0.0	0.0		1.1
31.00	31	31.0	0.0	0.0		1.1
30.00	30	30.0	0.0	0.0		1.1
29.00	29	29.0	0.0	0.0		1.1
28.00	28	28.0	0.0	0.0		1.1
27.00	27	27.0	0.0	0.0		1.1
26.00	26	26.0	0.0	0.0		1.1
25.00	25	25.0	0.0	0.0		1.1

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the Innovative Instrument Co., Ltd.  
ANAB-2022-0223-001 Rev.0 Issue Date: 2022/07/17

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Certificate No: 22-ACT-007  
Request No: Req-2022-0223

9. Level linearity including the level range control

UUC Setting	STD	Measured		Acceptance	
		UUC (dB)	ERR (dB)	UNCERTAINTY ( $\pm$ dB)	Limit ( $\pm$ dB)
FAST / A	RSP (dB)				
UUC Range					
25 - 135	94	29.6	0.1	0.3	1.1
		94.0	0.0		1.1

10. Tone burst response

UUC Setting	STD	Anticipated		Measured		UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
		Yonburst (ms)	Ref (dB)	UUC (dB)	ERR (dB)		
A / 25 - 135							
UUC Time Response							
Fast	200	134.0	134.0	134.0	0.0		1.0
	2	177.0	177.0	177.0	0.0		+1.0, -0.5
	0.25	108.0	107.9	107.9	-0.1		+1.5, -0.0
Slow	200	137.6	127.6	127.6	0.0	0.3	1.0
	2	108.0	108.0	108.0	0.0		+1.0, -0.0
	300	128.0	128.0	128.0	0.0		1.0
	2	108.0	108.0	108.0	0.0		+1.0, -0.5
SEL	0.25	99.0	99.0	99.9	-0.1		+1.5, -0.0

11. Peak C Sound level

UUC Setting	Anticipated	Measured		Acceptance	
		UUC (dB)	ERR (dB)	UNCERTAINTY ( $\pm$ dB)	Limit ( $\pm$ dB)
FAST / C / 25 - 135	RSP (dB)				
STD Settling					
Complete cycle	131.4	132.9	-0.50		3.0
Positive half cycle	132.4	132.2	-0.20	0.2	2.0
Negative half cycle	132.4	132.2	-0.20		2.0

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the Innovative Instrument Co., Ltd.  
ANAB-2022-0223-001 Rev.0 Issue Date: 2022/07/17

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Certificate No. 25-ACT-067  
Request No. Req-2022-0223

#### 12. Overload Indication

UVC Setting	Measured	UNCERTAINTY	Acceptance Limit
FAST / A / 25 - 138	UVC	(± dB)	1 ± dB
STD Setting	(dB)		
Positive one-half cycle	128.4		
Negative one-half cycle	139.4		
Divided	0.0	0.2	1.5

#### 13. Multi Level Stability

UVC Setting	Measured	UNCERTAINTY	Acceptance Limit
FAST / A / 25 - 138	UVC	(± dB)	1 ± dB
STD Setting	(dB)		
Initial	137.0		
Final	137.0		
Deviation	0.0	0.1	0.3

End of Certificate

## SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

451-451/1 Siithorn Rd, Bangbunru, Bangkok 10700 THAILAND.  
Tel: 0-2435-8800 Fax: 0-2433-1679 e-mail: cal-center@sithphom.com Http://www.sithphom.com

Cert. No. : ACL22075  
Pages : 1 of 8

### Calibration Certificate

Equipment : SOUND LEVEL METER

Manufacturer : RION

Model : NL-42/ Microphone UC-52 / Preamplifier NH-24

Serial No.: 00709682 / 187256 / 01233

ID No.:

Condition As Found : GOOD

Customer :

UNITED ANALYST AND ENGINEERING CONSULTANT (UAE)  
81 SOI UDONSUK 41, SUKHUMVIT ROAD,  
BANGCHAK SUB-DISTRICT,  
PHRAKHAONG DISTRICT, BANGKOK 10260  
THAILAND.

Location :

Ambient Temperature : ( 23.0 ± 3 ) °C

Pressure : ( 101.3 ± 3 ) kPa

Relative Humidity : ( 50.0 ± 20 ) %

Received Date : 18 JANUARY 2022

Calibration Date : 21-25 JANUARY 2022

Date of Issue : 28 JANUARY 2022

Calibrated by :

Nitthakorn Pisutpaian

Approved by :

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.



Continuation of Calibration Certificate

Cert. No. : ACL22075  
Job No. : VC65AC0044  
Pages : 2 of 8

Calibration Procedure : CP-AC-01

Calibration Method :

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

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

Condition of this result of calibration :

1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33210A	MY48017076	EP-0012-21	10-Feb-22
Waveform Generator	33511B	MY52302742	EP-0011-21	10-Feb-22
Digital Multimeter	33461A	MY53220104	EEL.BP. 05/0264	10-Feb-22
Digital Multimeter	33461A	MY53220076	EEL.BP. 03/0264	08-Feb-22
Digital Multimeter	34461A	MY60024273	1-15180725251-1	15-Sep-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 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).

Continuation of Calibration Certificate

Cert. No. : ACL22075  
Job No. : VC65AC0044  
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	-	-	-	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

Continuation of Calibration Certificate

Cert. No. : ACL22075  
Job No. : VC65AC0044  
Pages : 4 of 8

Result of calibration:

1. Absolute sensitivity

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

2. Self-generated noise

2.1 Normal test

Measured Value (dB)
14.2

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

Frequency Weighting	Measured value (dB)
A - weight	10.8
C - weight	16.7
Flat	22.5

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
125	0.1	0.1	0.1
1000	-0.1	-0.1	-0.1
8000	0.8	0.9	0.9
			±5.0

Continuation of Calibration Certificate

Cert. No. : ACL22075  
Job No. : VC65AC0044  
Pages : 5 of 8

4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)		
	Flat	C-weight	A-weight
63	-0.1	0.0	0.0
125	0.0	0.0	0.0
250	0.0	0.0	-0.1
500	0.0	0.0	-0.1
1000	0.0	0.0	0.0
2000	0.0	0.0	0.0
4000	0.0	0.0	0.0
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

Continuation of Calibration Certificate

Cert. No. : ACL22075  
Job No. : VC65AC0044  
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	130.9	-0.1	± 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	29.1	0.1	± 1.1
28.0	28.1	0.1	± 1.1
27.0	27.1	0.1	± 1.1
26.0	26.0	0.0	± 1.1
25.0	25.1	0.1	± 1.1

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Continuation of Calibration Certificate

Cert. No. : ACL22075  
Job No. : VC65AC0044  
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. Tone burst response

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

10. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, L <sub>peak</sub> (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	135.1	-0.3	± 2.0

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Continuation of Calibration Certificate

Cert. No. : ACL23075  
Job No. : VC65AC0044  
Pages : 8 of 8

11. Overhead Indication

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

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

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INNOVATIVE INSTRUMENT CALIBRATION LAB  
INNOVATIVE INSTRUMENT (P.L) LTD HEAD OFFICE  
719 MOO 11 SOI SUTINAKORN II TAMBON BANG KARB  
AMPHUR KANG MUANG SAHAT TAMBON PHUWONG THAI ANCH  
TEL: 0899-3186560-1 FAX: 0899-31107-140



Certificate of Calibration

Customer  
Name : UNITED ANALYST AND ENGINEERING CONSULTANT CO. LTD  
Address : Rt. Su. Udonnath 41 Sathumvit Road, Bangchak, Prachin Buri, 10260  
Certificate No : 22-AC-034  
Request No : REQ-2022-0095

Unit Under Calibration Details

Measurement Item : Sound Level Meter  
Manufacturer : LARSON DAVIS  
Model : LXT2  
Serial Number : 0005400  
ID : LALEPM.0372564  
Resolution : 0.1 dB  
Calibration Environmental and Details  
Temperature : 23 °C ± 2 °C  
Humidity : 50%RH ± 20%RH  
Barometric Pressure : 1013 hPa ± 10 hPa  
Received Date : 14 January 2022  
Calibrated Date : 21 January 2022  
Calibration Procedure : In-house method (N-SLM-01) based on IEC 61672-1 : 2013 Electromechanics - Sound level meters - Part 1, Recalibration  
Location of Calibration : Lab Anurong  
Reference Standard :  
Microphone Class : 2  
Microphone Model : 375A04  
Microphone SN : 328676  
Preamplifier Model : PRA1.AT7C  
Preamplifier SN : 071903  
Instrument Status : Used

Reference Standard

Instrument	Brand	Model	SN	Date calibration	Expiry
Standard Microphone	GRAS	40AH	180273	15 September 2022	GRAS
Multi-frequency Calibrator	Quest	Questcal	ET-A000234	14 June 2022	TSI
Audio Generator	Scanset	Scanset01	121	18 October 2022	WK Hecue

NOTE

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

This result is valid only for the item calibrated. The certificate (this) will not be reproduced except in full, without written permission. 08/01/2022 08:17:19 เอกสารไม่ควบคุม

Certificate No : 25-AC7-036  
Request No : Req-2022-0095

#### 1. Indication at the calibration check frequency

UUC Setting	Standard Level (dB)	Before Adjust		Adjust		UNCERTAINTY (± dB)	Acceptance Limit (± dB)
		UUC (dB)	ERR (dB)	UUC (dB)	ERR (dB)		
FAST / A / 37-139							
Calibrator Setting							
1000 Hz 114.00 dB	113.85	113.9	-0.05	113.9	0.05	0.20	0.3

Note : Absolute sensitivity was established by the use of Sound Calibrator Brand SVANTEK Model SV 15A, SN: S9029

#### 2. Self-generated noise, Microphone installed

UUC Setting	Measured (dB)	UNCERTAINTY (± dB)
FAST / 37-139	29.0	0.10
UUC Weighting		
A		

#### 3. Self-generated noise, Microphone replaced by the electrical input signal device

UUC Setting	Measured (dB)	UNCERTAINTY (± dB)
FAST / 37-139	28.8	0.10
UUC Weighting		
A	28.2	0.10
C	32.9	0.10

#### 4. Acoustic signal test of frequency weightings (Without Windscreen)

UUC Settings	Deviation from various Frequency Weighting Response curve					UNCERTAINTY		Acceptance Limit (± dB)
	Weighting Response curve					(± dB)		
	A (dB)	C (dB)	Z (dB)					
FAST / 37-139								
STD Setting								
125 Hz	-0.1	0.1	0.0	0.39	0.39	2.0	2.0	
1000 Hz	0.0	0.0	0.0	0.50	0.50	1.0	1.0	
4000 Hz	0.5	0.5	0.6	0.60	0.60	3.0	3.0	
8000 Hz	0.4	0.4	0.5	0.70	0.70	5.0	5.0	

Certificate No : 25-AC7-036  
Request No : Req-2022-0095

#### 5. Electrical signal test of frequency weightings, Weighting network response with relative to 1 kHz

UUC Setting	Deviation from various Frequency Weighting Response curve				UNCERTAINTY (± dB)	Acceptance Limit (± dB)
	A (dB)	C (dB)	Z (dB)	ERR (dB)		
FAST / 37-139						
STD Setting						
63 Hz	-0.2	-0.1	0.0	0.0		2.0
125 Hz	-0.1	0.0	0.0	0.0		1.5
250 Hz	-0.1	0.0	0.0	0.0		1.5
500 Hz	-0.1	0.0	0.0	0.0	0.2	1.5
1000 Hz	0.0	0.0	0.0	0.0		1.0
2000 Hz	0.0	0.0	0.0	0.0		2.0
4000 Hz	0.0	0.0	0.0	0.0		3.0
8000 Hz	-0.1	0.0	0.0	0.0		5
16000 Hz	-0.1	-0.1	0.0	0.0		-5, -INF.

#### 6. Frequency and tone weightings at 1kHz

UUC Setting	STD REF (dB)	Measured		UNCERTAINTY (± dB)	Acceptance Limit (± dB)
		UUC (dB)	ERR (dB)		
		ERR (dB)	ERR (dB)		
FAST / 37-139					
UUC Weighting					
A	114.00	114.0	0.0	0.2	0.2
C	114.00	114.0	0.0	0.2	0.2
Z	114.00	114.0	0.0	0.2	0.2

UUC Setting	STD REF (dB)	Measured		UNCERTAINTY (± dB)	Acceptance Limit (± dB)
		UUC (dB)	ERR (dB)		
		ERR (dB)	ERR (dB)		
37-139 / A					
UUC Time Response					
Fast	114.00	114.0	0.0	0.1	0.1
Slow	114.00	114.0	0.0	0.1	0.1
Leq	114.00	114.0	0.0	0.1	0.1



Certificate No: 22-ACT-036  
Request No: Req-2022-0095

### 7. Long Term Stability

UUC Setting	Measured	Acceptance Limit
FAST / A / 37-139	UUC (dB)	(± dB)
STD Setting	Initial	Final
	114.0	114.0
Deviation	0.0	0.3

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

UUC Setting	Anticipated	Deviation	Acceptance Limit
FAST / A / 37-139	REF (dB)	UUC (dB) ERR (dB)	UNCERTAINTY (± dB)
STD dB	839	139.0 0.0	0.3
178.00	134	134.0 0.0	1.1
125.00	129	129.0 0.0	1.1
124.00	124	124.0 0.0	1.1
119.00	119	119.0 0.0	1.1
114.00	114	114.0 0.0	1.1
109.00	109	109.0 0.0	1.1
104.00	104	104.0 0.0	1.1
99.00	99	99.0 0.0	1.1
94.00	94	93.9 -0.1	1.1
89.00	89	88.9 -0.1	1.1
84.00	84	83.9 -0.1	1.1
79.00	79	78.9 -0.1	1.1
74.00	74	73.9 -0.1	1.1
69.00	69	69.0 0.0	1.1
64.00	64	63.9 -0.1	1.1
59.00	59	59.0 0.0	1.1
54.00	54	54.0 0.0	1.1
49.00	49	49.0 0.0	0.8
44.00	44	44.1 0.1	1.1
39.00	39	39.3 0.3	1.1
34.00	34	34.3 0.3	1.1
29.00	29	29.5 0.5	1.1



Certificate No: 22-ACT-036  
Request No: Req-2022-0095

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

UUC Setting	STD	Anticipated	Measured	Acceptance Limit
FAST / A	REF (dB)	UUC (dB) ERR (dB)	UNCERTAINTY (± dB)	(± dB)
UUC Range	42.9	43.2 0.3	0.3	1.1
37-139	114	114.0 0.0	0.3	1.1

### 10. Tone burst response

UUC Setting	STD	Anticipated	Measured	Acceptance Limit
A / 37-139	Timeburst (ms)	Ref (dB)	UUC (dB) ERR (dB)	UNCERTAINTY (± dB)
UUC Time Response	200	115.0	125.0 0.0	1
Fast	2	118.0	117.8 -0.2	+1.0, -2.5
	0.25	109.0	108.8 -0.2	+1.5, -3.0
Slow	200	128.6	128.5 -0.1	1
	2	109.0	108.8 -0.2	+1.0, -3.0
SFL	200	129.0	129.0 0.0	1
	2	109.0	109.0 0.0	+1.0, -2.5
	0.25	100.0	99.9 -0.1	+1.5, -3.0

### 11. Peak C Sound level

UUC Setting	Anticipated	Measured	Acceptance Limit
FAST / C / 95-142	REF (dB)	UUC (dB) ERR (dB)	UNCERTAINTY (± dB)
STD Setting	137.4	136.9 -0.50	3.0
Complete cycle	136.4	136.2 -0.20	2.0
Positive half cycle	136.4	136.2 -0.20	2.0
Negative half cycle	136.4	136.2 -0.20	2.0

Certificate of Calibration

Customer : UNITED ANALYST AND ENGINEERING CONSULTANT CO., LTD. Certificate No : 22-ACT-103  
Name : R1 Soi Lodomuk-41, Sukhumvit Road, Bangkok, Prakanong, Bangkok Request No : Req-2022-0230  
Address : 10260

Unit Under Calibration Details

Measurement Item : Sound Level Meter Microphone Class : 2  
Manufacturer : LARSON DAVIS Microphone Model : J75A04  
Model : LxT2 Microphone SN : J750608  
Serial Number : 0005402 Pre-amplifier Model : PREAMLX73C  
ID : UAE.EFAL0302354 Pre-amplifier SN : 071540  
Resolution : 0.1 dB Intentional Status : Used

Calibration Environment and Details

Temperature :  $23^{\circ}\text{C} \pm 2^{\circ}\text{C}$   
Humidity :  $50\% \text{RH} \pm 20\% \text{RH}$   
Barometric Pressure :  $1013 \text{ hPa} \pm 10 \text{ hPa}$   
Received Date : 31 January 2022  
Calibration Due : 11 February 2023

Calibration Procedure : In-house method CP-SLM-01 based on IEC 61672-1 : 2013 Electromechanics - Sound level meters Part 3: Periodic tests

Location of Calibration : Lab Acoustic

Reference Standard

Instrument	Brand	Model	SN	Due calibration	Traceability
Standard Microphone	GRAS	40AN	188273	15 September 2022	GRAS
Mistifrequency Calibrator	Quest	Quest-eal	EP4000234	14 June 2022	TSN
Audio Generator	Sennheiser	Sennheiser	131	18 October 2022	WY Electric

Note

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

Calibrated by :



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EAS7063.Md01 Rev01 (since Jan 01/2017)

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Certificate No : 22-ACT-016  
Request No : Req-2022-0095

12. Overload Indication

UUC Setting	Measured	UNCERTAINTY	Acceptance Limit
FAST / A / 37-139	UUC		Limit
STD Setting	(dB)	( $\pm 0.8$ )	( $\pm 0.8$ )
Positive over-half cycle	142.1		
Negative over-half cycle	141.9		
Derived	0.2	0.2	1.5

13. High Level Stability

UUC Setting	Measured	UNCERTAINTY	Acceptance Limit
FAST / A / 37-139	UUC		Limit
STD Setting	(dB)	( $\pm 0.8$ )	( $\pm 0.8$ )
Initial	135.0		
Final	135.0		
Derived	0.0	0.1	0.3

End of Certificate

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the Innovative Instrument Co., Ltd.  
EAS7063.Md01 Rev01 (since Jan 01/2017)

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Certificate No : 22-ACT-103  
Request No : Req-2022-0230

1. Indication at the calibration check frequency

UUC Setting	Nominal Level (dB)	Before Adjust		Adjust		Acceptance Limit (± dB)
		UUC (dB)	ERR (dB)	UUC (dB)	ERR (dB)	
FAST / 37-139						
Calibrator Setting						
1000 Hz 114.00 dB	113.85	114.00	+0.15	113.9	0.05	0.3

Note : Absolute sensitivity was established by the use of SonaLab Calibrator Model SV35A, SN 38079

2. Self-generated noise, Microphone installed

UUC Setting	Measured (dB)	UNCERTAINTY (± dB)
FAST / 37-139		
UUC Weighting		
A	28.1	0.10

3. Self-generated noise, Microphone replaced by the electrical input signal device

UUC Setting	Measured (dB)	UNCERTAINTY (± dB)
FAST / 37-139		
UUC Weighting		
A	28.1	0.10
C	27.9	0.10
Z	34.4	0.10

4. Acoustic signal test of frequency weightings (Without Windscreen)

UUC Setting	Deviation from various Frequency Weighting Response curve				UNCERTAINTY Limits (± dB)	Acceptance Limits (± dB)
	A	C	Z			
FAST / 37-139	(dB)	(dB)	(dB)			
STD Setting						
125 Hz	0.0	0.1	0.1		0.50	2.0
1000 Hz	0.0	0.0	0.0		0.60	2.0
4000 Hz	0.9	0.9	1.0		0.60	3.0
8000 Hz	0.2	0.7	0.8		0.70	5.0

Certificate No : 22-ACT-103  
Request No : Req-2022-0230

5. Electrical signal test of frequency weightings, Weighting network response with relative to 1 kHz

UUC Setting	Deviation from various Frequency Weighting Response curve	UNCERTAINTY (± dB)	Acceptance Limit (± dB)
FAST / 37-139			
STD Setting			
63 Hz	-0.2	0.0	2.0
125 Hz	-0.1	0.0	1.5
250 Hz	-0.1	0.0	1.5
500 Hz	-0.1	0.0	1.5
1000 Hz	0.0	0.0	1.0
2000 Hz	0.0	0.1	2.0
4000 Hz	0.0	0.0	3.0
8000 Hz	0.0	0.0	5.0
16000 Hz	-0.1	-0.1	-15, -0.5

6. Frequency and time weightings at 1kHz

UUC Setting	STD REF (dB)	Measured		UNCERTAINTY (± dB)	Acceptance Limit (± dB)
		UUC (dB)	ERR (dB)		
		(dB)	(dB)		
FAST / 37-139					
UUC Weighting					
A	114.00	114.0	0.0	0.2	0.2
C	114.00	114.0	0.0	0.2	0.2
Z	114.00	114.0	0.0	0.2	0.2

UUC Setting	STD REF (dB)	Measured		UNCERTAINTY (± dB)	Acceptance Limit (± dB)
		UUC (dB)	ERR (dB)		
		(dB)	(dB)		
FAST / 37-139 / A					
UUC Time Response					
Fast	114.00	114.0	0.0	0.1	0.1
Slow	114.00	114.0	0.0	0.1	0.1
L4q	114.00	114.0	0.0	0.1	0.1





Certificate No: 22-ACT-103  
Request No: Req-2022-0210

7. Long Term Stability

UUC Setting	Measured	Acceptance	
		UNCERTAINTY ( $\pm$ dB)	Limit ( $\pm$ dB)
FAST / A / 37-139	UUC (dB)		
STD Setting			
Initial	114.0		
Final	114.0		
Deviation	0.0	0.1	0.3

8. Level linearity on the reference level range

UUC Setting	Antidistorted	Deviation		Acceptance
		REF (dB)	ERR (dB)	
FAST / A / 37-139				
STD dB				
130.00	139	129.0	0.0	1.1
134.00	134	134.0	0.0	1.1
139.00	129	129.0	0.0	1.1
124.00	124	124.0	0.0	1.1
119.00	119	119.0	0.0	1.1
114.00	114	114.0	0.0	1.1
109.00	109	109.0	0.0	1.1
104.00	104	104.0	0.0	1.1
99.00	99	99.0	0.0	1.1
94.00	94	94.0	0.0	1.1
89.00	89	89.0	0.0	1.1
84.00	84	84.0	0.0	1.1
79.00	79	79.0	0.0	1.1
74.00	74	74.0	0.0	1.1
69.00	69	69.0	0.0	1.1
64.00	64	64.0	0.0	1.1
59.00	59	59.0	0.0	1.1
54.00	54	54.0	0.0	1.1
49.00	49	49.0	0.0	1.1
44.00	44	44.0	0.0	1.1
39.00	39	39.0	0.0	1.1
34.00	34	34.0	0.0	1.1

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PSE-708-583401 Rev.01 Issue Date: 01/20/21

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Certificate No: 22-ACT-103  
Request No: Req-2022-0210

9. Level linearity including the level range control

UUC Setting	STD REF (dB)	Measured		UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
		UUC (dB)	ERR (dB)		
UUC Range	-43.2	42.9	-0.3		1.1
37-139	114	114.0	0.0	0.3	1.1

10. Tone burst response

UUC Setting	STD Toneburst (m)	Antidistorted Ref (dB)	Measured		UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
			UUC (dB)	ERR (dB)		
Fast	200	135.0	135.0	0.0		1.0
	2	118.0	117.7	-0.3		+1.0, -2.5
	0.25	109.0	108.7	-0.3		+1.5, -5.0
Slow	200	138.6	128.5	-10.1	0.3	1.0
	2	109.0	108.9	-0.1		+1.0, -5.0
	200	129.4	129.0	0.0		1.0
SEL	2	109.4	109.0	0.0		+1.0, -2.5
	0.25	100.0	99.9	-0.1		+1.5, -5.0

21. Peak C Sound level

UUC Setting	Antidistorted REF (dB)	Measured		UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
		UUC (dB)	ERR (dB)		
FAST / C / 95-142					
STD Setting					
Complete cycle	137.4	136.7	-0.70		3.0
Positive half cycle	136.4	136.1	-0.30	0.2	2.0
Negative half cycle	136.4	136.2	-0.20		2.0

The results related only to the item calibration. The certificate shall not be reproduced except in full, without written approval of the Innovative Instrument Co., Ltd.  
PSE-708-583401 Rev.01 Issue Date: 01/20/21

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Certificate No 22-ACT-103  
Request No Req-2022-0239

12. Overload Indication

UUC Setting	Measured	UNCERTAINTY	Acceptance Limit
FAST / A / 37-139	UUC (dB)	(± dB)	(± dB)
STD Setting			
Positive one-half cycle	142.2		
Negative one-half cycle	142.3		
Deviated	-0.1	0.2	1.5

13. High Level Stability

UUC Setting	Measured	UNCERTAINTY	Acceptance Limit
FAST / A / 37-139	UUC (dB)	(± dB)	(± dB)
STD Setting			
Initial	138.0		
Final	138.0		
Deviated	0.0	0.1	0.3

End of Certificate

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Certificate No 22-ACT-104  
Request No Req-2022-0232

3. Indication at the calibration check frequency

UUC Setting	Nominal Level (dB)	Before Adjust		Adjusted		Acceptance Limit (± dB)
		UUC (dB)	ERR (dB)	UUC (dB)	ERR (dB)	
FAST / A, 37-139						
Calibrator Setting						
1000 Hz 114.00 dB	113.85	114.0	-0.15	113.9	0.05	0.3

Note : Absolute sensitivity was established by the use of Sound Calibrator Brand SVANTEK, Model SV 35A, SN 58079

2. Self-generated noise, Microphone installed

UUC Setting	Measured	UNCERTAINTY (± dB)
FAST / 37-139		
UUC Weighting		
A	28.7	0.10

3. Self-generated noise, Microphone replaced by the electrical input signal device

UUC Setting	Measured	UNCERTAINTY (± dB)
FAST / 37-139		
UUC Weighting		
A	28.6	0.10
C	28.8	0.10
Z	34.7	0.10

4. Acoustic signal test of frequency weightings

UUC Setting	Deviation from various frequency Weighting Response curve				Acceptance Limit (± dB)
	A	C	Z	UNCERTAINTY (± dB)	
FAST / 37-139					
STD Setting					
125 Hz	0.0	0.1	0.1	0.50	2.0
1000 Hz	0.0	0.0	0.0	0.60	1.0
4000 Hz	0.7	0.7	0.7	0.60	3.0
8000 Hz	1.0	0.9	0.8	0.70	5.0

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FM-708-SJ-M-01 Rev-0 Issue date 01/01/19

เอกสารไม่ควบคุม

Certificate No 22-ACT-104  
Request No Req-2022-0232

5. Electrical signal test of frequency weightings, Weighting network response with relative to 1 kHz

UUC Setting	Deviation from various frequency Weighting Response curve				Acceptance Limit (± dB)
	A (dB)	C (dB)	Z (dB)	UNCERTAINTY (± dB)	
FAST / 37-139					
STD Setting					
63 Hz	-0.2	0.0	0.0		2.0
125 Hz	-0.1	0.0	0.0		1.5
250 Hz	-0.1	0.0	0.0		1.5
500 Hz	-0.1	0.0	0.0		1.5
1000 Hz	0.0	0.0	0.0	0.2	1.0
2000 Hz	0.0	0.1	0.0		2.0
4000 Hz	0.0	0.0	0.0		3.0
8000 Hz	0.0	0.0	0.0		5.0
16000 Hz	-0.1	-0.1	-0.1		+5, -11P

6. Frequency and time weightings at 3kHz

UUC Setting	STD REF (dB)	Measured		Acceptance Limit (± dB)
		UUC (dB)	ERR (dB)	
FAST / 37-139				
UUC Weighting				
A	114.00	114.0	0.0	0.2
C	114.00	114.0	0.0	0.2
Z	114.00	114.0	0.0	0.2

UUC Setting	STD REF (dB)	Measured		Acceptance Limit (± dB)
		UUC (dB)	ERR (dB)	
37-139 / A				
UUC Time Response				
Fast	114.00	114.0	0.0	0.1
Slow	114.00	114.0	0.0	0.1
Leq	114.00	114.0	0.0	0.1

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FM-708-SJ-M-01 Rev-0 Issue date 01/01/19

เอกสารไม่ควบคุม

Certificate No : 22-ACT-104  
Request No : Req-2022-0232

7. Long Term Stability

UUC Setting	Measured	UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
FAST / A / 37-139	UUC (dB)		
STD Setting			
Initial	114.0		
Final	114.0		
Deviated	0.0	0.1	0.3

8. Level linearity on the reference level range

UUC Setting	Anticipated	Deviation	UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
FAST / A / 37-139	REF (dB)	ERR (dB)		
STD dB				
140.00	140	140.0	0.0	1.1
135.00	139	135.0	0.0	1.1
134.00	134	134.0	0.0	1.1
129.00	129	129.0	0.0	1.1
124.00	124	124.0	0.0	1.1
119.00	119	119.0	0.0	1.1
114.00	114	114.0	0.0	1.1
109.00	109	109.0	0.0	1.1
104.00	104	104.0	0.0	1.1
99.00	99	99.0	0.0	1.1
94.00	94	94.0	0.0	1.1
89.00	89	89.0	0.0	1.1
84.00	84	84.0	0.0	1.1
79.00	79	79.0	0.0	1.1
74.00	74	74.0	0.0	1.1
69.00	69	69.0	0.0	1.1
64.00	64	64.0	0.0	1.1
59.00	59	59.0	0.0	1.1
54.00	54	54.0	0.0	1.1
49.00	49	49.0	0.0	1.1
44.00	44	44.1	0.1	1.1
39.00	39	39.3	0.3	1.1

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FSI-2019-01-01 Rev.0 twice date 01/07/15

เอกสารไม่ควบคุม

Certificate No : 22-ACT-104  
Request No : Req-2022-0232

9. Level linearity including the level range control

UUC Setting	STD	Measured	UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
FAST / A	REF (dB)	ERR (dB)		
UUC Range				
44.1	44.1	-0.4		1.1
114	114.0	0.0	0.3	1.1

10. Tone burst response

UUC Setting	STD	Anticipated	Measured	UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
A / 37-139	Toneburst (ms)	Ref (dB)	ERR (dB)		
UUC Time Response					
Fast	200	135.0	135.0	0.0	1.0
	2	118.0	117.9	-0.1	+1.0, -2.5
	0.25	109.0	108.7	-0.3	+1.5, -5.0
Slow	200	128.6	128.5	-0.1	1.0
	2	109.8	108.8	-0.2	+1.0, -5.0
	200	129.8	129.0	0.0	1.0
SEL	2	109.0	109.1	+0.1	+1.0, -2.5
	0.25	100.0	99.7	-0.3	+1.5, -5.0

11. Peak C Sound level

UUC Setting	Anticipated	Measured	UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
FAST / C / 95-142	REF (dB)	ERR (dB)		
STD Setting				
Complete cycle	137.4	-0.70		3.0
Positive half cycle	136.4	-0.20	0.2	2.0
Negative half cycle	136.4	-0.20		2.0

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the Innovativ Instrument Co., Ltd.  
FSI-2019-01-01 Rev.0 twice date 01/07/15

เอกสารไม่ควบคุม

Certificate No : 22-ACT-104  
Request No : Req-2022-0232

12. Overload Indication

UUC Setting	Measured	Uncertainty	Acceptance Limit
FAST / A / 37-139	UUC (dB)	( $\pm$ dB)	( $\pm$ dB)
STD Setting			
Positive one-half cycle	122.7		
Negative one-half cycle	142.6		
Deviated	0.1	0.2	1.5

13. High Level Stability

UUC Setting	Measured	Uncertainty	Acceptance Limit
FAST / A / 37-139	UUC (dB)	( $\pm$ dB)	( $\pm$ dB)
STD Setting			
Initial	138.0		
Final	138.0		
Deviated	0.0	0.1	0.3

End of Certificate

Certificate of Calibration

Customer : UNITED ANALYST AND ENGINEERING CONSULTANT CO., LTD.  
Name : 81 Soi Udomsak 41, Sukhumvit Road, Bangkok, Pratinthong, Bangkok 10540  
Address : Request No : Req-2022-1241

Item Under Calibration Details

Measurements Item : Noise dosimeter  
Manufacturer : SVANTEK  
Model : SV 1015  
Serial Number : 67627  
ID : UAE BPM 1062361  
Resolution : 0.1 dB  
Calibration Environment and Details  
Temperature : 23 °C  $\pm$  2 °C  
Humidity : 50 %RH  $\pm$  20 %RH  
Barometric Pressure : 1013 hPa  $\pm$  10 hPa  
Received Date : 10 September 2021  
Calibration Date : 29 September 2021  
Calibration Procedure : In-house method (CP-NIM-01) based on IEC 61259 : 2017  
Location of Calibration : Lab Acoustic  
Reference Standard : Lab Acoustic

Instrument	Brand	Model	S/N	Due calibration	Traceability
Multi-frequency Calibrator	Quest	Quest-01	106272	14 June 2022	TSM
Standard Microphone	GRAS	40AN	106273	29 October 2021	GRAS
Shot Generator	Stevick	Stev001	131	30 September 2021	WPC Electric
Timer	EXTREM	-	05-ACT	29 March 2021	TPA

Note

The reported uncertainty is based on statistical uncertainty multiplied by the Coverage Factor k = 2, providing a level of confidence approximately 95 %.

Calibrated By :

### 1. Absolute acoustical sensitivity

UVC Setting	Time		Exposure Measurement		UNCERTAINTY (%)	Tolerances Limit (%)
	Ref	19°C (s)	Ref (F <sub>100</sub> h)	DUV (F <sub>100</sub> h)		
FAST / A / 40-140						
Calibrator Setting	60	40	3.23	3.20	3.0	-31 ~ +36
1000 Hz 114 dB	120.00	120		-0.03		

Note: Absolute accuracy was established by the use of Sound Calibrator Model 913A and 917A.

## 2. Frequency weightings

EUC Scaling	Deviation from values		INCERTAINTY	Tolerances Limit (±dB)
	Frequency Weighting	C		
FAST/60-Hz	A	C		
STB Scaling	(dB)	(dB)		
40 Hz	-1.0	-1.0	0.40	3.0
125 Hz	-0.4	-0.3	0.40	1.5
250 Hz	-0.1	-0.1	0.40	1.5
500 Hz	-0.1	0.0	0.40	1.5
1000 Hz	0.0	0.0	0.40	-
2000 Hz	0.0	0.1	0.40	3.0
4000 Hz	-0.8	-0.9	0.40	3.0
8000 Hz	-2.1	-2.1	0.40	5.0

## b. Sound exposure meter linearity of error

EBC Setting	Time		Exposure Measurement			UNCERTAINTY (%)	TOLERANCE LIMIT (%)
	Ref	UVC	Ref	UVC	Error (%)		
PAST / A / 80 / 400							
Calibrator Setting							
1000 Hz 110 dB	27	27	0.31	0.30	0.00		
1000 Hz 110 dB	45	45	0.51	0.50	0.00		
1000 Hz 110 dB	50	49	1.00	0.99	-1.00	4.3	
1000 Hz 110 dB	100	100	2.00	1.98	-1.00		
1000 Hz 120 dB	36	36	4.00	4.03	+0.75		
1000 Hz 120 dB	72	72	8.00	8.05	+0.63		
1000 Hz 120 dB	90	90	10.00	10.13	+1.30		
1000 Hz 120 dB	180	180	20.00	20.22	+1.10	3.8	
1000 Hz 120 dB	360	360	40.00	40.34	+0.84		
1000 Hz 120 dB	720	720	80.00	80.49	+0.61		

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Certificate No : 21-ACT-361  
Request No : Req-2021-1241

4. Response to short duration

a. Response for sinusoidal signals - reference level

UUC Setting	Time			Exposure Measurement		Tolerances Limit (% h)
	Ref	UUC	Ref	UUC	Error	
FAST / A / 60-140	(h)	(h)	(% h)	(% h)	(% h)	(% h)
Calibrator Setting	2846	2846	1.00	0.99	-0.01	-0.29 ~ 0.41
4000 Hz 95 dB						

b. Sound exposure meter response for series of toneburst impulses

UUC Setting	Time			Exposure Measurement		Tolerances Limit (%)
	Ref	UUC	Ref	UUC	Error	
FAST / A / 60-140	(h)	(h)	(% h)	(% h)	(%)	(%)
Calibrator Setting	2846	2846	1.00	0.99	-1.00	-21 ~ -26
Burst 1 sec. 95 dB	900	900	1.00	0.99	-1.00	-21 ~ -41
Burst 3 sec. 100 dB	143	143	1.00	0.99	-1.00	-21 ~ -41

5. Response to unicolor pulse

UUC Setting	Time			Exposure Measurement		Tolerances Limit (%)
	Ref	UUC	Ref	UUC	Error	
FAST / A / 60-140	(h)	(h)	(% h)	(% h)	(%)	(%)
Calibrator Setting	10.61	10.61	1.00	10.61	0.00	-21 ~ -26
Continuous Rectangle *						
Continuous Rectangle *						

End of Certificate

Calibrated By :



Note  
The reported uncertainty is based on standard uncertainty multiplied by the Coverage Factor k = 2, providing a level of confidence approximately 95 %.

Certificate of Calibration

Customer : UNITED ANALYST AND ENGINEERING CONSULTANT CO., LTD.  
Name : B1 5th Udonruek 41, Subbunwong Road, Bangkok, Prakanong, Bangkok 10260  
Address : B1 5th Udonruek 41, Subbunwong Road, Bangkok, Prakanong, Bangkok 10260  
Certificate No : 22-ACT-114  
Request No : Req-2022-0331

Unit Under Calibration Details

Measurement Item : Noise dominator  
Manufacturer : SVANTEK  
Model : SV104  
Serial Number : 91923  
ID : -  
Resolution : 0.1 dB  
Calibration Environment and Details  
Temperature : 23 °C ± 2 °C  
Humidity : 50 %RH ± 20 %RH  
Barometric Pressure : 1013 hPa ± 10 hPa  
Received Date : 14 February 2022  
Calibrated Date : 17 February 2022  
Calibration Procedure : In-house method CPN/DMA-01 based on IEC 61252 : 2017  
Location of Calibration : Full Acoustic  
Reference Standard : Instrument Brand Model SN, True calibration Traceability

Instrument Status : Used

Pre-amplifier SN : -

Microphone Class : 2

Microphone Model : SV27

Microphone SN : 94604

Microphone Class : 2

Microphone Model : SV27

Microphone SN : 94604

Microphone Class : 2

Microphone Model : SV27

Microphone SN : 94604

Microphone Class : 2

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Microphone Class : 2

Microphone Model : SV27

Microphone SN : 94604

Certificate No : 22-ACT-114  
Request No : (04-2022-0331)

1. Absolute acoustical sensitivity

UUC Setting	Time		Exposure Measurement		Tolerances Limit (%)
	Ref (s)	UUC (s)	Ref (Pa s)	Error (%)	
FAST / A / 55-140	120.00	120	5.23	-0.03	-31, +26

Note : Absolute sensitivity was established by the use of Sound Calibrator Brand SVANTER, Model SV 35A, SN. 58079

2. Frequency weightings

UUC Setting	Deviation from various Frequency Weighting		Tolerances Limit (±dB)
	A (dB)	C (dB)	
FAST / 35-140			
97D Setting			
63 Hz	-0.3	-0.1	2.0
125 Hz	-0.1	-0.2	1.5
250 Hz	-0.2	-0.3	1.5
500 Hz	-0.2	-0.2	1.5
1000 Hz	0.0	0.0	2.0
2000 Hz	0.0	0.0	2.0
3000 Hz	1.2	1.2	3.0
3000 Hz	-1.4	-1.3	5.0

Certificate No : 22-ACT-114  
Request No : (04-2022-0331)

3. Linearity of response to steady signals

a. Sound exposure meter, linearity of response for changes of input sinusoidal signal level

UUC Setting	FAST / A / High									
	Ref (dB)	59.0	80.0	90.0	100.0	110.0	114.0	120.0	130.0	140.0
1000 Hz	Level A (dB)	54.5	79.9	90.1	100.0	110.0	114.0	120.0	130.0	140.0
	Error (dB)	-0.5	-0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0
	Ref (dB)	54.5	79.9	90.1	100.0	110.0	114.0	120.0	130.0	140.0
8000 Hz	Level A (dB)	54.5	79.9	90.1	100.0	110.0	114.0	120.0	130.0	140.0
	Error (dB)	-0.5	-0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0
	Ref (dB)	54.5	79.9	90.1	100.0	110.0	114.0	120.0	130.0	140.0
63 Hz	Level A (dB)	54.5	79.9	90.1	100.0	110.0	114.0	120.0	130.0	140.0
	Error (dB)	-0.5	-0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0
	Ref (dB)	54.5	79.9	90.1	100.0	110.0	114.0	120.0	130.0	140.0
Tolerances Unit (±dB)		1.0								
UNCERTAINTY (±dB)		0.27								

b. Sound exposure meter linearity of error

UUC Setting	Time		Exposure Measurement				UNCERTAINTY (%)	Tolerances Limit (%)
	Ref (s)	UUC (s)	Ref (Pa s)	UUC (Pa s)	Error (%)			
FAST / A / 55-140								
Calibrator Setting								
1000 Hz 110 dB	27	27	0.30	0.30	0.00			
1000 Hz 110 dB	45	45	0.50	0.51	+2.00			
1000 Hz 110 dB	90	90	1.00	1.01	+1.00	4.3		
1000 Hz 110 dB	180	180	2.00	2.02	-1.00			
1000 Hz 120 dB	36	36	4.00	3.94	-1.50			
1000 Hz 120 dB	72	72	8.00	7.87	-1.63			-21, +26
1000 Hz 120 dB	90	90	10.00	9.90	-1.00			
1000 Hz 120 dB	180	180	20.00	19.76	-1.20	3.8		
1000 Hz 130 dB	360	360	40.00	39.42	-1.45			
1000 Hz 120 dB	720	720	80.00	78.66	-1.68			





Certificate No : 23-AL-T-033  
Request No : Req-2023-0091

1. Absolute acoustical sensitivity

UUC Setting	Time		Exposure Measurement		Tolerance Limit (%)
	Ref	UUC (s)	Ref (Pa.s)	Error (%)	
FAST / A / 55-140 Calibrator Setting					
1000 Hz 114 dB	120.00	120	3.23	-0.93	3.0

Note: Absolute sensitivity was established by the use of Sound Calibrator Brand SYNSTEC, Model SV 15A, SN 58970

2. Frequency weightings

UUC Setting	Deviation from various Frequency Weighting		Tolerance Limit (%)
	A (dB)	C (dB)	
FAST / A / 55-140 STD Setting			
63 Hz	-0.3	-0.3	2.0
125 Hz	-0.3	-0.2	1.5
250 Hz	-0.2	-0.1	1.5
500 Hz	-0.2	-0.2	1.5
1000 Hz	0.0	0.0	-
2000 Hz	0.4	0.5	2.0
4000 Hz	0.2	0.3	3.0
8000 Hz	-1.8	-1.9	5.0

3. Uncertainty of response to steady signals

a. Sound exposure meter, linearity of response for changes of input sinusoidal signal level

UUC Setting	FAST / A / High									
	Ref	(dB)	55.0	60.0	65.0	70.0	75.0	80.0	85.0	90.0
1000 Hz	Level A	(dB)	54.2	60.1	66.1	72.1	78.1	84.1	90.1	96.1
	Error	(dB)	-0.8	0.1	0.1	0.1	0.1	0.1	0.1	0.1
5000 Hz	Ref	(dB)	58.5	64.5	70.5	76.5	82.5	88.5	94.5	100.5
	Level A	(dB)	58.5	64.5	70.5	76.5	82.5	88.5	94.5	100.5
	Error	(dB)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
63 Hz	Ref	(dB)	82.8	88.8	94.8	100.8	106.8	112.8	118.8	124.8
	Level A	(dB)	82.8	88.8	94.8	100.8	106.8	112.8	118.8	124.8
	Error	(dB)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tolerances Limit	(±dB)		1.0							
UNCERTAINTY	(±dB)		0.27							

b. Sound exposure meter linearity of error

UUC Setting	Time		Exposure Measurement		Tolerance Limit (%)
	Ref	UUC (s)	Ref (Pa.s)	Error (%)	
FAST / A / 55-140 Calibrator Setting					
1000 Hz 110 dB	27	27	0.30	0.30	0.00
1000 Hz 110 dB	45	45	0.50	0.50	0.00
1000 Hz 110 dB	90	90	1.00	1.01	+1.00
1000 Hz 110 dB	180	180	2.00	2.02	+1.00
1000 Hz 120 dB	36	36	4.00	4.03	+0.75
1000 Hz 120 dB	72	72	8.00	8.05	+0.63
1000 Hz 120 dB	90	90	10.00	10.13	+1.30
1000 Hz 120 dB	180	180	20.00	20.22	+1.10
1000 Hz 120 dB	360	360	40.00	40.34	+0.83
1000 Hz 120 dB	720	720	80.00	80.49	+0.61

Certificate No : 22-ACT-033  
Request No : Req-2022-0091

#### 4. Response to short duration

##### a. Response for sinusoidal signals - reference level

UUC Setting	Time	Ref	UUC	Ref	UUC	Error	UNCERTAINTY	Tolerance Limit
FAST / A : 55-140		(s)	(Pa <sup>2</sup> /h)	(Pa <sup>2</sup> /h)	(Pa <sup>2</sup> /h)	(%)	(%)	(Pa <sup>2</sup> /h)
Calibrator Setting								
4000 Hz 95 dB	2846	2846	0.99	0.99	-0.01	0.01	0.01	-0.29 - 0.41

##### b. Sound exposure meter response for series of toneburst impulses

UUC Setting	Time	Ref	UUC	Ref	UUC	Error	UNCERTAINTY	Tolerance Limit
FAST / A : 55-140		(s)	(Pa <sup>2</sup> /h)	(Pa <sup>2</sup> /h)	(Pa <sup>2</sup> /h)	(%)	(%)	(Pa <sup>2</sup> /h)
Calibrator Setting								
Burst 1 ms, 95 dB	2846	2846	0.99	1.00	-1.00	3.0	3.0	-21 - +26
Burst 1 ms, 100 dB	900	900	1.00	1.00	0.00	3.0	3.0	-21 - +44
Burst 1 ms, 108 dB	143	143	1.00	1.00	0.00	3.0	3.0	-21 - +41

#### 5. Response to unipolar pulse

UUC Setting	Time	Ref	UUC	Ref	UUC	Error	UNCERTAINTY	Tolerance Limit
FAST / A : 55-140		(s)	(Pa <sup>2</sup> /h)	(Pa <sup>2</sup> /h)	(Pa <sup>2</sup> /h)	(%)	(%)	(Pa <sup>2</sup> /h)
Calibrator Setting								
Continuous Rectangle *	7	10.86	10.86	10.86	0.00	2.4	2.4	-21 - +26
Continuous Rectangle *								

\* Indicates non accredited

End of Certificate

#### Certificate of Calibration

Customer

Name : UNITED ANALYST AND ENGINEERING CONSULTANT CO. LTD. Certificate No : 21-ACT-326  
Address : 81 Soi Udomsak 41, Sukhumvit Road, Bangkok, Request No : Req-2021-0994  
Prakanong, Bangkok 10260

#### Unit Under Calibration Details

Measurement Item : Acoustic Calibrator Class : 1  
Manufacturer : SYVANTEK Range : 94 - 114 dB / 1000 Hz  
Model : SV36 Instrument Status : Used  
Serial Number : 107224  
ID : UAE.FRM.171/2564

#### Calibration Environment and Details

Temperature : (23 ±2 °C)  
Humidity : (50 ±20 %RH)  
Barometric Pressure : (1013 ±10.0 hPa)  
Received Date : 22 July 2021  
Calibration Date : 24 August 2021

Location of Calibration : LAB 1 Acoustic

Calibration Procedure : In-house method CP-ACT-02 based on IEC 60942:2017 Electroacoustics - Sound calibrations

Reference Standard	Model	Serial Number	Traceable	Due Calibration
Sound Calibrator	SV 35A	58079	EEL	14 May 2022
TID Multimeter	2013	1047765	NIMT	21 January 2022

Traceability : This certificate provides traceability of measurement to recognized national standard, and to the realization of the International System of Units (SI).

Note

The reported uncertainty is based on standard uncertainty multiplied by the Coverage Factor k=2, providing a level of confidence approximately 95 %.

Calibrated By

Certificate No : 21-ACCT-326  
 Request No : Roy-2021-0994

Calibration Results : Without Adjustment

Sound pressure level

Calibration Range (dB)	Without Adjustment (dB)		Adjustment (dB)		Uncertainty ( $\pm$ dB)	Acceptance limit Class 1 ( $\pm$ dB)
	Measured	Error	Measured	Error		
94 dB / 1000 Hz	94.08	0.08	-	-	0.11	0.25
114 dB / 1000 Hz	114.13	0.13	-	-	0.11	0.25

Frequency of Sound pressure level

Calibration Range (Hz)	Without Adjustment		Adjustment		Uncertainty ( $\pm$ %)	Acceptance limit Class 1 ( $\pm$ %)
	Measured (Hz)	Error (%)	Measured (Hz)	Error (%)		
94 dB / 1000 Hz	999.96	0.004	-	-	0.10	0.70
114 dB / 1000 Hz	999.98	0.002	-	-	0.10	0.70

Total Harmonic Distortion plus Noise of Sound pressure level (THD+N %)

Calibration Range (Hz)	Without Adjustment		Adjustment		Uncertainty ( $\pm$ %)	Acceptance limit Class 1 ( $\pm$ %)
	Measured (%)	Error (%)	Measured (%)	Error (%)		
94 dB / 1000 Hz	0.43	-	-	-	0.40	2.5
114 dB / 1000 Hz	0.35	-	-	-	0.40	2.5

Note :

- Acceptance limit was ISO 9001:2015 Class 1
- The calibration result exclude the calibration pressure correction
- The calibration result exclude the microphone volume correction

End of Calibration



TSC-788-165 17025.  
 CALIFORNIA 01282

# Accuracy Calibration Certificate

**Company:** United Analysts and Engineering Consultants Co., Ltd.  
**Address:** 2 Set Udon Suk 41, Sukhumvit Rd., Bang Chak  
**City:** Phra Pramong  
**Zip / Postal:** 10260  
**State / Province:** Bangkok  
**Order Number:**

**Contact:** Saei Charoek

Manufacturer:	Mettler Toledo	Instrument Type:	Weighting Instrument
Model:	AB094-S	Asset Number:	UAE-AR-010U2460
Serial No.:	112311239	Terminal Model:	N/A
Buildings:	N/A	Terminal Serial No.:	N/A
Floor:	2	Terminal Asset No.:	N/A
Roof:	Below Floor 2 (008)		
Range	1	Max. Capacity	Rangeability (g)
		220 g	0.0001 g

**Calibration Guidelines:**  
**METTLER TOLEDO Work Instructions:**

This calibration certificate contains measurements for As Found calibration. No As Left calibration was performed because the device was not modified after As Found calibration. Therefore, results for As Left correspond to As Found.

The sensitivity/span of this weighing instrument was adjusted before calibration with a built-in weight.

In accordance with EURAMET cg-18 (1/2015), the test loads were selected to reflect the specific use of the weighing device or to accommodate specific calibration conditions.

EURAMET cg-18 v.4.0 (1/2015)  
Mettler Toledo Calibration Services  
CPM000270

Temperature		Humidity	
As Found	Start: 22.5 °C End: 21.4 °C	Start: 56.1 %	End: 63.2 %

As Found Calibration Date:	07-Apr-2022	Calibration:
As Left Calibration Date:	N/A	
Issue Date:	05-Apr-2022	

**Approved Signatory:**

Report Version: 2.18.13  
 Report Version: 2.21.0.2018

[illegible]

with the assistance of the author's colleagues in laboratory.

## เอกสารไม่ควบคุม

Due Date of Calibration: schedule the program once a year at least once a year.

United Analysts and Engineering Consultant Company Limited.  
Accredited Laboratories According to ISO/IEC 17025

No.	Instrument/Equipment	Parameter	Manufacturer	Model/Serial No.	Calibrator	No.	Certification	Date of Calibration	Due date of Calibration*	Remarks
1	Analytical Balance (readability 0.1 mg)	PH110	Mettler-Toledo	AB204-S / 1128312528	Mettler-Toledo (Thailand) Ltd.	TH2058-097-040722	ACC-TH	7 Apr 22	6 Apr 23	-
2	Analytical Balance (readability 0.1 mg)	PH110	Mettler-Toledo	AB204-S/FACT / 0108115858	Mettler-Toledo (Thailand) Ltd.	TH2058-095-040722	ACC-TH	7 Apr 22	6 Apr 23	-
3	UV-VIS Spectrophotometer (NOX as NO2)	Agilent	Agilent Technologies	CMV65680A / N4715410009	DCE Services Co.,Ltd.	SP22-016	SP22-016	31 May 22	30 May 23	-
4	UV-VIS Spectrophotometer	Heraeus	Heraeus	U-1900 / 2021-064	DCE Services Co.,Ltd.	SP22-007	SP22-007	20 Jun 22	19 Jun 23	-
5	Water meter	virtuflow/mo-flow	Mettler-Toledo	Seven Easy 530 / 1231155210	National Food Institute, Ministry of Industry, Thailand	Z201793-001-01	1 Mar 22	28 Feb 23	-	-
6	Water meter		Mettler-Toledo	Seven Easy 530 / 1230525212	National Food Institute, Ministry of Industry, Thailand	Z202093-001-01	16 Mar 22	15 Mar 23	-	-
7	Analytical Balance (readability 0.01 mg)	pharmareu	Mettler-Toledo	XSR205PU / C210685394	Mettler-Toledo (Thailand) Ltd.	Z058-043-050622-ACC	9 May 22	8 May 23	-	-
8	Hot Air Oven		Mettler	UF55 / B216.1666	Technology Promotion Association (Thailand-Japan)	Z17TA1876	29 Oct 21	28 Oct 22	-	-
9	BOD Incubator	TEKH	Acco	UC4-1320 / (UJEWAO.015/2561)	Technology Promotion Association (Thailand-Japan)	Z27MW90	17 Feb 22	16 Feb 23	-	-
10	Analytical Balance (readability 0.1 mg)	Urbanshiwa	Mettler-Toledo	AB-204S/FACT / 112936310	National Food Institute, Ministry of Industry, Thailand	Z203120-001-01	1 Jun 22	31 May 23	-	-

អង្គការសហប្រតិបត្តិការអន្តរជាតិ បានប្រកាសថា កម្ពុជា គឺជាប្រទេសមួយដែលមានប្រជាជនចំនួន ១៥ លាននាក់។

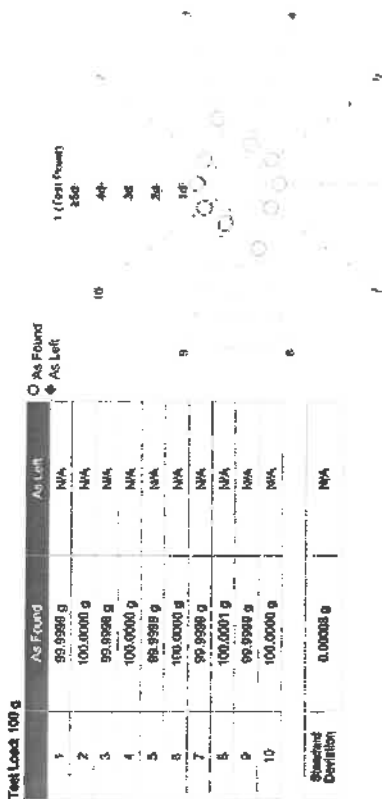
5952 HAWAII - PALMYRA

ကဏ္ဍမူလအကျဉ်းချုပ်အားလုံးကို အောက်ဖော်ပြပါအတိုင်း ဖော်ပြထားပါသည်။

မိမိ၏ လူမှုရေးဝါဒများကို အခြေခံ (Principles)၊ အကျဉ်းချုပ် ဝေဖန်ချက်များကို အကျဉ်းချုပ် ဖော်ပြပါမည်။

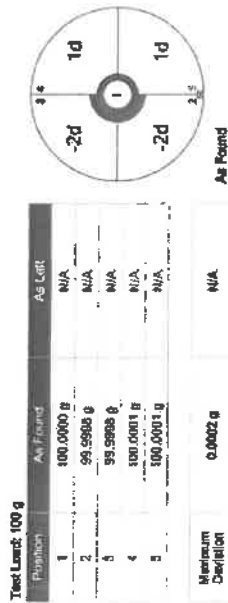
## Measurement Results

### Repeatability



The 'x' in this graph represents the readability of the range/interval in which the test was performed.  
The results of the graph are based upon the absolute values of the differences from the target value.

### Eccentricity



The 'x' in the graph represents the readability of the range/interval in which the test was performed.

## Error of Indication

### As Found

Reference Value	Indication	Error of Indication	Expanded Uncertainty	k
0.0000 g	0.0000 g	0.0000 g	0.18 mg	2
0.1000 g	0.1000 g	0.0000 g	0.19 mg	2
1.0000 g	0.9999 g	-0.0001 g	0.19 mg	2
5.0000 g	5.0000 g	0.0000 g	0.19 mg	2
10.0000 g	9.9999 g	-0.0001 g	0.20 mg	2
20.0000 g	20.0000 g	0.0000 g	0.21 mg	2
50.0000 g	50.0000 g	0.0000 g	0.23 mg	2
70.0000 g	70.0000 g	0.0000 g	0.25 mg	2
100.0000 g	100.0000 g	0.0000 g	0.29 mg	2
150.0000 g	150.0002 g	0.0002 g	0.40 mg	2
200.0000 g	200.0003 g	0.0003 g	0.45 mg	2

As Found

As Left

For improved legibility of the graphics only increasing measurement points are shown and measurement points close to zero are not displayed.

The uncertainty stated in the expanded uncertainty at calibration obtained by multiplying the standard combined uncertainty by the coverage factor k - which can be larger than 2 according to EURAMET 55-18. The value of the measurement lies within the assigned range of values with a probability of approximately 95%.

The user is responsible for maintaining environmental conditions and the settings of the weighing instrument which it was calibrated.

### Test Equipment

All weights used for metrological testing are traceable to national or international standards. The weights were calibrated and certified by an accredited calibration laboratory.

#### Weight Set 1: OIML S2

Weight Set No.: W5860 Date of Issue: 23-Feb-2022

Certificate Number: C206591831 Calibration Due Date: 14-Aug-2023

#### Thermo Hygrometer

Equipment No.: B1861 Date of Issue: 14-Jun-2021

Certificate Number: 21H1220 Calibration Due Date: 01-Jun-2022

Remarks

Equipment condition: Good  
Next calibration according to customer's procedure  
Calibration data not decided by calibration laboratory  
Test weight by Filar pan : 1 g = 0.99999 g, 3 g = 3.00000 g, 5 g = 5.00000 g

End of Accredited Section

The information below and any attachments to this calibration certificate are not part of the accredited calibration.

Measurement Uncertainty of the Weighing Instrument in Use

Stated is the expanded uncertainty with  $k=2$  to use. The formula shall be used for the estimation of the uncertainty under consideration of the errors of indication. The value  $R$  represents the net load indication in the unit of measure of the device.

Temperature coefficient for the evaluation of the measurement uncertainty in use:  $3.0 \cdot 10^{-6} / K$

Temperature range on site for the evaluation of the measurement uncertainty in use:  $3 K$

Linearization of Uncertainty Equation

Range d	Max	As Found	As Left
1 0.0001 g	220 g	$U_k = 0.19 \text{ mg} + 0.00817 \text{ mg/g} \cdot R$	N/A

To optimize the usability of the specification, besides of the zero load only increasing measurement points with a load of 5% of the measurement range or larger are taken for the calculation of the linear equation.

Absolute and Relative Measurement Uncertainty in Use for Various Net Indications (Examples)

Net Indication	As Found	As Left
0.0220 g	0.19 mg	N/A
0.2100 g	0.18 mg	N/A
2.2000 g	0.21 mg	N/A
22.0000 g	0.37 mg	N/A
220.0000 g	2.0 mg	N/A



## Customer

[illegible][illegible]

Range	Max. Capacity	Reactivity (g)
1	220 g	0.0001 g

Calibration Guidelines:  
METTLER TOLEDO Work Instructions:

This calibration certificate contains measurements for As Found and As Left calibrations. The sensitization of the weighing instrument was acquired before As Found and As Left calibrations with a built-in weight. In accordance with EURAMET-cg-16 (1/2015), 10 test loads were selected to reflect the specific use of the weighing device or to accommodate specific calibration conditions.

Temperature		Humidity	
As Found	Start: 22.6 °C    End: 22.1 °C	Start: 56.0 %    End: 51.9 %	
As Lot	Start: 22.3 °C    End: 22.4 °C	Start: 46.2 %    End: 59.6 %	

As Found Calibration Date:	07-Apr-2022	Calibration:
As Left Calibration Date:	07-Apr-2022	
Issue Date:	08-Apr-2022	

**Approved Slavery:**

## Measurement Results

### Repeatability

Test Load: 100 g

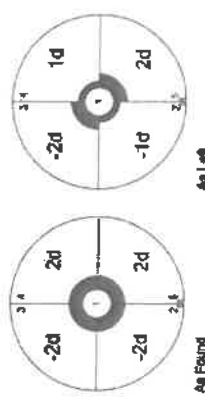
	As Found	As Left
1	100.0005 g	93.9399 g
2	100.0004 g	100.0000 g
3	100.0004 g	93.9399 g
4	100.0005 g	100.0000 g
5	100.0005 g	93.9399 g
6	100.0004 g	93.9399 g
7	100.0005 g	100.0000 g
8	100.0005 g	100.0000 g
9	100.0005 g	100.0000 g
10	100.0005 g	100.0000 g
Standard Deviation	0.00007 g	0.00007 g

The "x" in the graph represents the readability of the sample interval in which the test was performed.

### Excerpt

**Test Load: 100 lb**

Position	As Target	As Left
1	100.0000 g	100.0000 g
2	100.0003 g	99.9999 g
3	100.0003 g	99.9998 g
4	100.0007 g	100.0007 g
5	100.0007 g	100.0002 g
<b>Standard Deviation</b>	<b>0.0002 g</b>	<b>0.0002 g</b>



The "a" in the graph represents the readability of the marginal interval in which the tool was performed.



### Error of Indication

As Found	Reference Value	Indication	Error of Indication	Expanded Uncertainty	k
1	0.0000 g	0.0000 g	0.0000 g	0.15 mg	2
2	0.1000 g	0.1001 g	0.0001 g	0.18 mg	2
3	1.0000 g	0.9999 g	-0.0001 g	0.16 mg	2
4	5.0000 g	5.0000 g	0.0000 g	0.16 mg	2
5	10.0000 g	10.0001 g	0.0001 g	0.17 mg	2
6	20.0000 g	20.0001 g	0.0001 g	0.18 mg	2
7	30.0000 g	30.0003 g	0.0003 g	0.20 mg	2
8	70.0001 g	70.0005 g	0.0004 g	0.26 mg	2
9	100.0000 g	100.0005 g	0.0005 g	0.27 mg	2
10	150.0000 g	150.0007 g	0.0007 g	0.38 mg	2
11	200.0001 g	200.0008 g	0.0007 g	0.44 mg	2

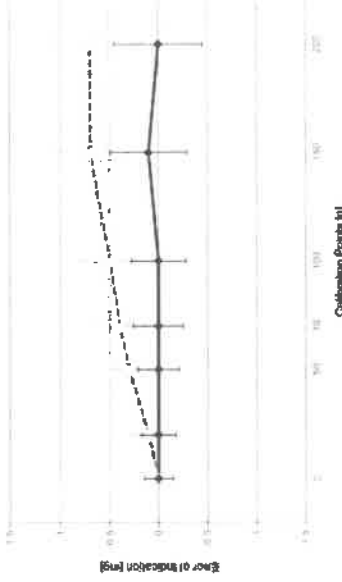
### As Left

Reference Value	Indication	Error of Indication	Expanded Uncertainty	k
0.0000 g	0.0000 g	0.0000 g	0.15 mg	2
0.1000 g	0.1000 g	0.0000 g	0.18 mg	2
1.0000 g	0.9999 g	-0.0001 g	0.17 mg	2
5.0000 g	5.0000 g	0.0000 g	0.17 mg	2
10.0000 g	10.0000 g	0.0000 g	0.17 mg	2
20.0000 g	20.0000 g	0.0000 g	0.19 mg	2
50.0000 g	50.0000 g	0.0000 g	0.21 mg	2
70.0001 g	70.0001 g	0.0000 g	0.25 mg	2
100.0000 g	100.0000 g	0.0000 g	0.26 mg	2
150.0000 g	150.0001 g	0.0001 g	0.39 mg	2
200.0001 g	200.0001 g	0.0000 g	0.45 mg	2

### As Found

### As Left

For improved legibility of the graphics only increasing measurement points are shown and measurement points close to zero are not displayed.



The uncertainty stated is the expanded uncertainty at calibration obtained by multiplying the standard combined uncertainty by the coverage factor  $k=2$ , which can be larger than 2 according to EURAMET-cg-18. The value of the measured lies within the assigned range of values with a probability of approximately 95%.

The user is responsible for maintaining environmental conditions and the settings of the weighing instrument when it was calibrated.

### Test Equipment

All weights used for metrological testing are traceable to national or international standards. The weights were calibrated and certified by an accredited calibration laboratory.

#### Weight Set 1: OIML E2

Weight Set No.:	WS90	Date of Issue:	23-Feb-2022
Certificate Number:	C209581831	Calibration Due Date:	14-Aug-2023

#### Thermo Hygrometer

Equipment No.:	IN161	Date of Issue:	14-Jun-2021
Certificate Number:	21H1720	Calibration Due Date:	01-Jun-2022

### Remarks

FACT adjustment functionally activated

Value of the built-in weight adjusted

Equipment condition: Good

Next calibration according to customer's procedure

Calibration data not decided by calibration laboratory

Test weight by Filer pan: 1 g = 1.0000 g, 3 g = 3.0000 g, 5 g = 5.0000 g

End of Accredited Section

The information below and any attachments to this calibration certificate are not part of the accredited calibration.



**REPORT OF CALIBRATION**

Certificate No. : SP22-016 Page 2 of 5

Environment Condition : Ambient Temperature  $25 \pm 5$  °C

Relative humidity  $55 \pm 20$  %RH

Calibration method : In-house method CP-01 Based on ASTM E275-08

**Certified Reference Materials :**

Material	Serial No.	Certificate No.	Due date
Absorbance Standard set	25760	95915	22 October 2023
Absorbance Standard set	25757	95929	22 October 2023
Wavelength Standard set	25806	95916	22 October 2023
Wavelength Standard set	25758	95915	22 October 2023

**Traceability** : This certification is traceable to the International System of Unit maintained at National -

Institute of Standards and Technology (NIST) through Sarnia Scientific Limited

**Spectral Band Width of UUC :** 1.5 nm.

**Scan Speed of UUC :** 90 nm/min

**Scan Interval of UUC :** 0.15 nm.

**Resolution of UUC :** Photometric 0.0001 Abs.

**Wavelength** 0.1 nm.

**เอกสารไม่ควบคุม**

FW-708-02 R01 1/1/2023

**REPORT OF CALIBRATION**

Certificate No. : SP22-016 Page 3 of 5


Calibration Results : Without adjustment

**Photometric Accuracy :**

Wavelength (nm.)	CRMs Values (Abs)	UUC Reading (Abs)	Correction (Abs)	Uncertainty (Abs)	Coverage factor k
420	0.0000	0.0000	0.0000	0.0028	2.00
	0.5787	0.5755	0.0032	0.0031	2.00
	1.0490	1.0436	0.0054	0.0029	2.00
	2.1900	2.1847	0.0053	0.0075	2.00
440	0.0000	0.0000	0.0000	0.0028	2.00
	0.5607	0.5588	0.0019	0.0034	2.00
	1.0247	1.0232	0.0015	0.0035	2.00
	2.1229	2.1211	0.0018	0.0082	2.00
465	0.0000	0.0000	0.0000	0.0028	2.00
	0.5236	0.5197	0.0039	0.0029	2.00
	0.9634	0.9625	0.0009	0.0028	2.00
	1.9763	1.9752	0.0011	0.0070	2.00
546.1	0.0000	-0.0001	0.0001	0.0028	2.00
	0.5191	0.5171	0.0020	0.0031	2.00
	1.0003	0.9984	0.0019	0.0033	2.00
	1.9987	1.9946	0.0041	0.0084	2.00
590	0.0000	0.0000	0.0000	0.0028	2.00
	0.5523	0.5509	0.0014	0.0030	2.00
	1.0809	1.0799	0.0010	0.0029	2.00
	2.0391	2.0329	0.0062	0.0080	2.00
635	0.0000	0.0000	0.0000	0.0028	2.00
	0.5601	0.5584	0.0017	0.0031	2.00
	1.0512	1.0498	0.0014	0.0029	2.00
	1.9294	1.9265	0.0029	0.0082	2.00

**เอกสารไม่ควบคุม**


FW-708-02 R01 1/1/2023

<div> DQE Services Co., Ltd.  32 Soi Ladprao-Wangthai 55, Ladprao-Wangthai Rd., Ladprao, Ladprao, Bangkok 10230  Phone : +66 (0)2 518 2054, Email : dqservicethai@gmail.com </div> <div>  </div>					
<div> <b>DQE Services</b>  <b>REPORT OF CALIBRATION</b>  Certificate No. : SP22-016  Page 4 of 5  Photometric Accuracy : </div>					
Wavelength (nm.)	CRMs Values (Abs)	UUC Reading (Abs)	Correction (Abs)	Uncertainty (Abs)	Coverage factor k
235	0.0000 0.7478	0.0001 0.7421	-0.0001 0.0057	0.0050 0.0056	2.00 2.00
257	0.0000 0.8686	0.0000 0.8619	0.0000 0.0067	0.0050 0.0059	2.00 2.00
313	0.0000 0.2912	0.0000 0.2896	0.0000 0.0016	0.0050 0.0051	2.00 2.00
350	0.0000 0.6448	0.0000 0.6403	0.0000 0.0045	0.0050 0.0055	2.00 2.00

DQE Services Co.,Ltd.

32 Soi Ladprao-Wangthai 55, Ladprao-Wangthai Rd., Ladprao, Bangkok 10230

Phone : +66 (0)2 518 2054, Email : dqservicethai@gmail.com


  
 DQE SERVICES CO., LTD.  
 CALIBRATION UNIT

DQE Services

REPORT OF CALIBRATION

Certificate No. : SP22-016

Page 5 of 5

Wavelength Accuracy :

CRMs Values (nm.)	UUC Reading (nm.)	Correction (nm.)	Uncertainty (nm.)	Coverage factor k
241.72	242.0	-0.28	0.18	2.00
279.45	279.5	-0.05	0.18	2.00
287.81	287.5	0.31	0.18	2.00
334.06	333.5	0.56	0.18	2.00
368.93	368.5	0.43	0.18	2.00
418.59	418.0	0.59	0.18	2.00
445.94	445.4	0.54	0.18	2.00
453.66	453.2	0.46	0.18	2.00
468.02	459.7	0.32	0.18	2.00
536.59	536.2	0.39	0.18	2.00
637.98	638.3	-0.32	0.18	2.00
431.38	431.0	0.38	0.18	2.00
472.50	472.5	0.00	0.18	2.00
513.47	513.5	-0.03	0.18	2.00
528.88	528.5	0.38	0.18	2.00
573.17	573.0	0.17	0.18	2.00
585.35	585.0	0.35	0.20	2.00
684.40	684.7	-0.30	0.18	2.00
740.72	740.8	-0.08	0.20	2.00
748.55	748.5	0.05	0.18	2.00
807.03	807.3	-0.27	0.18	2.00
879.28	879.0	0.28	0.18	2.00

Remark : - UUC = Unit Under Calibration

- N/A = Not Available

- The result expanded uncertainty of measurement U is stated as the standard uncertainty of measurement multiplied by the coverage factor k.

which for a normal distribution corresponds to a coverage probability of approximately 95%

- \* Indicates non TSI accredited

เอกสารไม่ควบคุม

PM-708-02 R01 /11/2021

- End of Certificate -

เอกสารไม่ควบคุม

PM-708-02 R01 /11/2021

CERTIFICATE OF CALIBRATION

Page 1 of 5

Certificate No. : SP22-007

Customer : United Analyst and Engineering Consultant Co.,Ltd. (Head Office)

Address : 3 Soi Udomsak 41, Sukhumvit Road, Bangkok, Phrakhamung,

Bangkok 10260

Location of calibration : Laboratory 315

Equipment : UV-Vis Spectrophotometer

Manufacturer : Hitachi

Model : U-1900

Serial No. : 2021-064


ID No. : UAE.WAS.0062532

Received Date : 20 January 2022

Calibration Date : 20 January 2022

Issue Date : 24 January 2022

Condition Instrument : Good

Calibrated by : 

The calibration result is applied only to the above-calibrated item and was found accurate as shown on date and place of calibration only.  
The measurement capability of the laboratory and its measurability is recognized national standards and to the unit of measurement related at the corresponding national standards laboratory. This certificate may not be impounded other than in full except with the prior written approval of the DQE Service Co., Ltd.

REPORT OF CALIBRATION

Page 2 of 5

Certificate No. : SP22-007

Environment Condition : Ambient Temperature  $25 \pm 5$  °C

Relative humidity  $55 \pm 20$  %RH

Calibration method : In-house method CP-01 Based on ASTM E275-08

Certified Reference Materials :

Material	Serial No.	Certificate No.	Due date
Absorbance Standard set	25760	95935	22 October 2023
Absorbance Standard set	25757	95929	22 October 2023
Wavelength Standard set	25806	95916	22 October 2023
Wavelength Standard set	25758	95915	22 October 2023

Traceability This certification is traceable to the International System of Unit maintained at National -

Institute of Standards and Technology (NIST) through Siam Scientific Limited

Spectral Band Width of UUC : 4.0 nm

Scan Speed of UUC : 200 nm/min

Scan Interval of UUC : 0.1 nm

Resolution of UUC : Photometric 0.001 Abs.

Wavelength 0.1 nm

**REPORT OF CALIBRATION**

Certificate No. : SP22-007  
 Calibration Results : Without adjustment

Photometric Accuracy :

Wavelength (nm.)	CRM's Values (Abs)	UUC Reading (Abs)	Correction (Abs)	Uncertainty (Abs)	Coverage Factor k
420	0.0000	0.000	0.0000	0.0028	2.00
	0.5787	0.577	0.0017	0.0031	2.00
	1.0490	1.050	-0.0010	0.0029	2.00
	2.1900	2.183	0.0070	0.0080	2.00
440	0.0000	0.000	0.0000	0.0028	2.00
	0.5607	0.560	0.0007	0.0034	2.00
	1.0247	1.023	0.0017	0.0035	2.00
	2.1229	2.118	0.0049	0.0079	2.00
465	0.0000	0.000	0.0000	0.0028	2.00
	0.5236	0.521	0.0026	0.0030	2.00
	0.9634	0.963	0.0004	0.0029	2.00
	1.9763	1.974	0.0023	0.0070	2.00
546.1	0.0000	0.000	0.0000	0.0028	2.00
	0.5191	0.518	0.0011	0.0031	2.00
	1.0003	1.000	0.0003	0.0033	2.00
	1.9987	1.996	0.0027	0.0084	2.00
590	0.0000	0.000	0.0000	0.0028	2.00
	0.5523	0.552	0.0003	0.0030	2.00
	1.0809	1.082	-0.0011	0.0030	2.00
	2.0391	2.033	0.0061	0.0079	2.00
635	0.0000	0.000	0.0000	0.0028	2.00
	0.5601	0.562	-0.0019	0.0031	2.00
	1.0512	1.052	-0.0008	0.0030	2.00
	1.9294	1.925	0.0044	0.0079	2.00

เอกสารไม่ควบคุม

**REPORT OF CALIBRATION**

Certificate No. : SP22-007  
 Photometric Accuracy :

Wavelength (nm.)	CRM's Values (Abs)	UUC Reading (Abs)	Correction (Abs)	Uncertainty (Abs)	Coverage Factor k
235	0.0000	0.000	0.0000	0.0030	2.00
	0.7478	0.746	0.0018	0.0037	2.00
257	0.0000	0.000	0.0000	0.0030	2.00
	0.8686	0.861	0.0076	0.0059	2.00
313	0.0000	0.000	0.0000	0.0030	2.00
	0.2912	0.291	0.0002	0.0031	2.00
350	0.0000	0.000	0.0000	0.0030	2.00
	0.6448	0.638	0.0068	0.0055	2.00

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Request No. 25-65 / 0398

MTC. ACL No. 486 / 65

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Certificate No.: SP22-007

Wavelength Accuracy:

## REPORT OF CALIBRATION

CRM Values (nm.)	WVC Reading (nm.)	Correction (nm.)	Uncertainty (nm.)	Coverage factor k
241.54	240.8	0.74	0.18	2.00
279.40	278.5	0.90	0.18	2.00
288.70	288.0	0.70	0.18	2.00
334.22	333.5	0.72	0.18	2.00
361.26	360.5	0.76	0.18	2.00
418.48	418.0	0.48	0.18	2.00
446.70	446.0	0.70	0.18	2.00
453.20	453.0	0.20	0.18	2.00
460.06	459.5	0.56	0.18	2.00
536.90	536.0	0.90	0.18	2.00
637.94	637.2	0.74	0.18	2.00
440.74	440.0	0.74	0.18	2.00
472.22	471.6	0.62	0.18	2.00
513.70	513.0	0.70	0.18	2.00
528.72	528.0	0.72	0.18	2.00
574.60	573.8	0.80	0.18	2.00
585.48	584.6	0.88	0.20	2.00
684.63	684.0	0.63	0.18	2.00
740.27	739.8	0.47	0.20	2.00
748.28	747.8	0.48	0.18	2.00
807.16	806.4	0.76	0.18	2.00
879.70	878.8	0.90	0.18	2.00

Remark: - WVC = Unit Under Calibration

- N/A = Not Available

- The result expanded uncertainty of measurement (U) is stated as the standard uncertainty of measurement multiplied by the coverage factor k.

which for a normal distribution corresponds to a coverage probability of approximately 95%

- \* Indicates non TISF accredited

- End of Certificate -

PM-508-02 R01 E/1/17021

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## CALIBRATION CERTIFICATE

NOMENCLATURE : 1. Atomic Absorption Spectrophotometer "Agilent Technologies"

Model AA240FS, Serial No. MY13160001

2. Working standard solution "Inorganic Ventures"

Multi Analyte Custom Grade Solution, Lot No. P2-ME8675610

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

3. Sol Ubomsakdi, Sukhumvit Road, Bangkok, Prakanong, Bangkok 10260

CALIBRATION PROCEDURE : 1. Performance Verification of Atomic Absorption Spectrophotometer (WA-500-02-30)

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

REFERENCE MATERIAL : Traceable to NIST "Agilent Technologies", "Carlo Erba"

Cadmium Lot No. 0108047046, Chromium Lot No. 0106315418, Copper Lot No. 0107480530, Iron Lot No. 0106697566,

Lead Lot No. 0104659473, Manganese Lot No. T109228A, Nickel Lot No. 0104978040, Zinc Lot No. 0100792297

CALIBRATION RANGE: 0.02.0.10.0.30.0.50.0.70 mg/l at 228.8 nm.Cd, 0.10.0.20.0.30.0.50.0.70 mg/l at 357.9 nm.Cr,  
0.05.0.10.0.30.0.50.0.70 mg/l at 324.7 nm.Cu, 0.10.0.30.0.50.0.70.1.00 mg/l at 248.3 nm.Fe, 0.20.0.50.0.70.1.00.1.50 mg/l  
at 217.0 nm.Pb, 0.05.0.10.0.30.0.50.0.70 mg/l at 279.5 nm.Mn, 0.10.0.30.0.50.0.70.1.00 mg/l at 232.0 nm.Ni,  
0.05.0.10.0.30.0.50.0.70 mg/l at 213.9 nm.Zn

AMBIENT CONDITIONS : Temperature 22 °C Relative humidity 60 %

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

Calibrated by

Ref. 2025265020400522001

Calibration Date : 3 February 2022

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

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

FILE:MTC 002 Rev.4

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Email : mtc@tistr.or.th

Office 176 Phahonvithay Road, Chatuchak Bangkok 10850, Thailand  
Tel. (66) 0 259 8363  
Fax. (66) 0 259 8363  
Email : sunsulee@tistr.or.th



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## CALIBRATION DATA

## 1. Noise Level in term of standard deviation

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

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## INDUSTRIAL METROLOGY AND TESTING SERVICE CENTRE

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## 2. Precision

Element	Conc. (mg/l)	Absorbance										Ave. Abs.	SD	%RSD
Cd	0.02	0.0074	0.0062	0.0065	0.0062	0.0070	0.0068	0.0070	0.0065	0.0065	0.0069	0.0069	0.0004	5.76
	0.30	0.0952	0.0959	0.0951	0.0957	0.0952	0.0950	0.0952	0.0948	0.0956	0.0943	0.0943	0.0005	0.49
	0.70	0.2213	0.2180	0.2203	0.2208	0.2234	0.2211	0.2196	0.2219	0.2201	0.2194	0.2211	0.0015	0.67
Cr	0.10	0.0096	0.0098	0.0097	0.0102	0.0106	0.0097	0.0098	0.0099	0.0103	0.0093	0.0101	0.0004	3.83
	0.30	0.0309	0.0302	0.0300	0.0316	0.0306	0.0299	0.0309	0.0297	0.0311	0.0296	0.0301	0.0011	1.70
	0.70	0.0659	0.0667	0.0664	0.0648	0.0656	0.0662	0.0658	0.0638	0.0658	0.0649	0.0656	0.0011	1.70
Cu	0.05	0.0080	0.0075	0.0078	0.0075	0.0077	0.0081	0.0080	0.0075	0.0074	0.0076	0.0076	0.0003	3.26
	0.30	0.0417	0.0419	0.0412	0.0421	0.0424	0.0420	0.0423	0.0403	0.0418	0.0415	0.0421	0.0006	1.47
	0.70	0.0969	0.0965	0.0972	0.0957	0.0961	0.0958	0.0961	0.0963	0.0959	0.0972	0.0966	0.0006	0.58
Fe	0.10	0.0090	0.0105	0.0078	0.0099	0.0091	0.0093	0.0096	0.0094	0.0093	0.0088	0.0099	0.0007	8.11
	0.50	0.0462	0.0470	0.0464	0.0464	0.0467	0.0462	0.0467	0.0460	0.0468	0.0466	0.0467	0.0003	0.67
	1.00	0.0867	0.0886	0.0910	0.0892	0.0897	0.0873	0.0882	0.0885	0.0868	0.0874	0.0881	0.0013	1.43
Pb	0.20	0.0091	0.0095	0.0088	0.0087	0.0082	0.0094	0.0090	0.0087	0.0082	0.0090	0.0089	0.0007	7.33
	0.70	0.0322	0.0321	0.0324	0.0318	0.0335	0.0326	0.0327	0.0315	0.0335	0.0321	0.0332	0.0007	2.09
	1.50	0.0653	0.0685	0.0663	0.0664	0.0652	0.0671	0.0662	0.0665	0.0657	0.0648	0.0666	0.0008	1.28
Mn	0.05	0.0092	0.0092	0.0097	0.0087	0.0085	0.0079	0.0096	0.0095	0.0084	0.0099	0.0099	0.0007	7.33
	0.30	0.0616	0.0630	0.0632	0.0633	0.0634	0.0628	0.0640	0.0633	0.0640	0.0629	0.0633	0.0007	1.08
	0.70	0.1396	0.1366	0.1386	0.1377	0.1386	0.1386	0.1396	0.1380	0.1374	0.1383	0.1388	0.0009	0.67
Ni	0.10	0.0102	0.0092	0.0097	0.0104	0.0091	0.0105	0.0105	0.0096	0.0098	0.0102	0.0101	0.0005	5.22
	0.50	0.0488	0.0489	0.0489	0.0495	0.0484	0.0490	0.0481	0.0492	0.0495	0.0492	0.0499	0.0004	0.91
	1.00	0.0976	0.0979	0.0975	0.0992	0.0977	0.0973	0.0986	0.0962	0.0985	0.0982	0.0998	0.0008	0.85
Zn	0.05	0.0540	0.0549	0.0540	0.0552	0.0537	0.0551	0.0544	0.0546	0.0549	0.0543	0.0543	0.0005	1.49
	0.30	0.1669	0.1653	0.1628	0.1642	0.1657	0.1637	0.1659	0.1632	0.1654	0.1657	0.1655	0.0012	0.72
	0.70	0.3456	0.3467	0.3405	0.3430	0.3422	0.3444	0.3437	0.3438	0.3435	0.3438	0.3441	0.0013	0.37

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## INDUSTRIAL METROLOGY AND TESTING SERVICE CENTRE

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MTC ACL No. 486 / 65

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MTC. ACL No. 486 / 65

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

Element	Standard Value of RM (mg/l)	Reading (mg/l)	Error of Measurement (mg/l)	Error of Measurement (%)	Uncertainty (mg/l)
Ni	0.099	0.102	0.003	3.03	± 0.007
	0.495	0.489	-0.006	1.21	± 0.010
	0.990	0.975	-0.015	1.52	± 0.020

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

Element	Standard Value of RM (mg/l)	Reading (mg/l)	Error of Measurement (mg/l)	Error of Measurement (%)	Uncertainty (mg/l)
Zn	0.050	0.050	0.000	0.00	± 0.012
	0.300	0.307	0.007	2.33	± 0.011
	0.700	0.660	-0.040	5.71	± 0.015

Remark : The reported uncertainty is an expanded uncertainty calculated using a coverage factor of 2 (k = 2) which gives a level of confidence of approximately 95%.

Calibrated by

## INDUSTRIAL METROLOGY AND TESTING SERVICE CENTRE

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Amphoe Muang, Chongue Samutprakan 10280, Thailand  
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FINAL/MTC/002 Rev.4

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## Calibration Certificate

Certificate No.:

2201793-001-01

Client name:

UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.

Address:

3 Soi Udomsak 41, Sukhumvit Road,  
Bangchak, Prakhong, Bangkok 10260

Page 1 of 3

Equipment

pH Meter

Manufacturer:

METTLER TOLEDO

Model:

SevenEasy pH

Serial No.:

1231185210

ID No.:

UAE.WAT.0102553

Order No.:

2201793

Operation No.:

2201793-001

Date of Receipt:

21 February 2022

Date of Calibration:

1 March 2022

Calibrated by

Mr. Phengnat Tunjit  
Scientist

Date of Issue:

1 March 2022

Two uncertainties are for a confidence probability of approximately 95%.

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

TC-009 Revision 00 Date: 14-12-21

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## Calibration Report

Certificate No.: 2201793-001-01  
Equipment: pH Meter  
Manufacturer: METTLER TOLEDO  
Model: SevenEasy pH  
Serial No.: 123115210  
Type: Bench top  
Resolution: 0.01 pH  
Sensitivity: 1 mV  
Date of Calibration: 1 March 2022

Location: Chemical Calibration Laboratory, NATIONAL FOOD INSTITUTE  
Ambient Temperature: ( 23.5 ± 1.5 ) °C  
Relative Humidity: ( 53 ± 3 ) %  
Condition of Equipment: Good Condition  
Condition of this Report of Calibration

1. Calibration Method  
In house method W-CO-002 based on direct measurement by using standard voltage calibrator and certified reference material (CRM)

2. Reference Standards / Certified Reference Material  
Substance  
2.1 DC Voltage Calibrator  
2.2 Digital Thermometer  
2.3 Thermo-Hygrometer

3. The calibration is traceable to The International System of Units (SI) (BIPM)  
3.1 Instruments No.2.1  
3.2 Instruments No.2.2  
3.3 Instruments No.2.3  
3.4 Certified Reference Material No. 2.4 to 2.6  
3.5 Certified Reference Material No. 2.7

4. This certificate is valid only for the instrument we calibrated.  
5. The result of calibration was found accurate as shown on date and place of calibration only.

## Calibration Report

Certificate No.: 2201793-001-01  
Equipment: pH Meter  
Manufacturer: METTLER TOLEDO  
Model: SevenEasy pH  
Serial No.: 123115210  
Type: Bench top  
Resolution: 0.01 pH  
Sensitivity: 1 mV  
Date of Calibration: 1 March 2022

Location: Chemical Calibration Laboratory, NATIONAL FOOD INSTITUTE  
Ambient Temperature: ( 23.5 ± 1.5 ) °C  
Relative Humidity: ( 53 ± 3 ) %  
Condition of Equipment: Good Condition  
Condition of this Report of Calibration

1. Calibration Method  
In house method W-CO-002 based on direct measurement by using standard voltage calibrator and certified reference material (CRM)

2. Reference Standards / Certified Reference Material  
Substance  
2.1 DC Voltage Calibrator  
2.2 Digital Thermometer  
2.3 Thermo-Hygrometer

3. The calibration is traceable to The International System of Units (SI) (BIPM)  
3.1 Instruments No.2.1  
3.2 Instruments No.2.2  
3.3 Instruments No.2.3  
3.4 Certified Reference Material No. 2.4 to 2.6  
3.5 Certified Reference Material No. 2.7

4. This certificate is valid only for the instrument we calibrated.  
5. The result of calibration was found accurate as shown on date and place of calibration only.



## Calibration Report

Certificate No.: 2201793-001-01  
Equipment: Digital Thermometer with RTD (pH Sensor)  
Resolution: 0.1 °C Model: SevenEasy pH  
Serial No.: 123159210 ID No.: UAE WAT 0102083  
Manufacturer: METTLER TOLEDO  
Date of Calibration: 1 March 2022

Location: Chemical Calibration Laboratory, NATIONAL FOOD INSTITUTE

Environment Condition:

Ambient Temperature: 24 °C ± 1 °C  
Relative Humidity: 50 % ± 2 %

### Condition of this results of Calibration:

- Calibration Method:
  - In house method: W-T-E-025 by comparison with standard thermometer.
  - The Calibration is determined by comparing with a known temperature from a standard resistance thermometer.
  - The temperature scale in use at this laboratory is the International Temperature scale of 1990 (ITS-90).

### Reference Standard Instrument:

Instrument	Model	Serial No.	Certificate No.	Due Date	Through
HAND-HELD THERMOMETER	1523	2118154			
Platinum Resistance Thermometer (PRT)	5827A	877322	PSL-7 045184	03-Jun-22	703774

Support Equipment: Low Temperature Bath (BDOCA-2), Model: Europa-6 Plus Basic, SN: 3414822

- This certificate is traceable to International System of Units (SI Units).
- This certificate was certified only for the instrument we calibrated.
- This result of calibration was found accurate as shown on date and place of calibration only.
- Condition of Calibrated Item: Good
- Result of Calibration: ☒ Without adjustment ☐ After adjustment



## Calibration Certificate

Certificate No.: 2202063-001-01  
Client name: UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.  
Address: 3 Soi Udomsak 41, Sukhumvit Road,  
Bangchuek, Prachinong, Bangkok 10260

Equipment: pH Meter  
Manufacturer: METTLER TOLEDO  
Model: SevenEasy pH  
Serial No.: 123052312  
ID No.: UAE WAS.0032553  
Order No.: 2202063  
Operation No.: 2202063-001  
Date of Receipt: 11 March 2022  
Date of Calibration: 16 March 2022

Calibrated by: Mr. Manas Somrak  
Specialist  
Date of Issue: 21 March 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 demonstrated the measurement capability of the laboratory and its responsibility in recognizing and controlling measurement uncertainty. It is not valid if requirements stipulated at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the National Food Institute.

## Calibration Report

Certificate No.: 2203059-001-01  
Equipment: pH Meter  
Resolution: 0.01 pH ± 1 mV  
Manufacturer: METTLER TOLEDO  
Model: SevenEasy pH  
Serial No.: 123052312  
Type: Bench top  
ID No.: UAE.WAS.0000253  
Date of Calibration: 16 March 2022  
Location: Chemical Calibration Laboratory, National Food Institute, Thailand  
Environment Condition: Ambient Temperature: 23.0 ± 0.5 °C Relative Humidity: (43.5 ± 5) %  
Condition of Equipment: Good Condition  
Condition of the Results of Calibration: In-house method: N-CC-002 based on direct measurement by using standard voltage customer and certified reference material (CRM)

Page 2 of 5

1. Calibration Method  
2. Reference Standards / Certified Reference Material  
3. Instruments  
4. Calibration Results  
5. Performance of the Instrument

1. Calibration Method  
2. Reference Standards / Certified Reference Material  
3. Instruments  
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1. Calibration Method  
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3. Instruments  
4. Calibration Results  
5. Performance of the Instrument

## Calibration Report

Certificate No.: 2203059-001-01  
Equipment: pH Meter  
Resolution: 0.01 pH ± 1 mV  
Manufacturer: METTLER TOLEDO  
Model: SevenEasy pH  
Serial No.: 123052312  
Type: Bench top  
ID No.: UAE.WAS.0000253  
Date of Calibration: 16 March 2022  
Location: Chemical Calibration Laboratory, National Food Institute, Thailand  
Environment Condition: Ambient Temperature: 23.0 ± 0.5 °C Relative Humidity: (43.5 ± 5) %  
Condition of Equipment: Good Condition  
Condition of the Results of Calibration: In-house method: N-CC-002 based on direct measurement by using standard voltage customer and certified reference material (CRM)

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1. Calibration Method  
2. Reference Standards / Certified Reference Material  
3. Instruments  
4. Calibration Results  
5. Performance of the Instrument

1. Calibration Method  
2. Reference Standards / Certified Reference Material  
3. Instruments  
4. Calibration Results  
5. Performance of the Instrument

1. Calibration Method  
2. Reference Standards / Certified Reference Material  
3. Instruments  
4. Calibration Results  
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3. Instruments  
4. Calibration Results  
5. Performance of the Instrument

1. Calibration Method  
2. Reference Standards / Certified Reference Material  
3. Instruments  
4. Calibration Results  
5. Performance of the Instrument

## Calibration Report

**Certificate No.:** 220303-001-01  
**Equipment:** Digital Thermometer with RTD (pH Meter)  
**Resolution:** 0.1 °C **Model:** SevenEasy pH  
**Serial No.:** 120052512 **ID No.:** UAEWAS.003/2553  
**Manufacturer:** METTLER TOLEDO  
**Date of Calibration:** 16 March 2022

Page 4 of 5

**Location:** Chemical Calibration Laboratory, National Food Institute.  
**Environment Condition:** Ambient Temperature ( 23.0 ± 1.0 ) °C  
 Relative Humidity ( 50 ± 4 ) %

### Condition of this results of Calibration:

1. Calibration Method :
  - In house method W-T-E-025 by comparison with standard thermometer.
  - The Calibration is determined by comparing with a known temperature from a standard resistance thermometer.
  - The temperature scale in use at this laboratory is the International Temperature scale of 1990 ( ITS-90 ).
2. Reference Standard Instrument :
  - Low Temperature Bath (BODAL-0), Model: Europe-6 Plus Basic, SN: 3419222

Instrument	Model	Serial No.	Certificate No.	Due Date	Through
HANDELD THERMOMETER	1523	2119164	PSL-X 085164	24-Jun-22	TESTER
Platinum Resistance Thermometer (PRT)	8627A	877302			

Support Equipment : Low Temperature Bath (BODAL-0), Model: Europe-6 Plus Basic, SN: 3419222

3. This certificate is traceable to International System of Units (SI Units).
4. This certificate was certified only for the instrument we calibrated.
5. The result of calibration was found accurate as shown on date and place of calibration only.

6. Condition of Calibrated Item : ☒ Good ☐ Without adjustment ☐ After adjustment

7. Result of Calibration : ☒ X

## Calibration Report

**Certificate No.:** 220303-001-01  
**Equipment:** Digital Thermometer with RTD (pH Meter)  
**Resolution:** 0.1 °C **Model:** SevenEasy pH  
**Serial No.:** 120052512 **ID No.:** UAEWAS.003/2553  
**Manufacturer:** METTLER TOLEDO  
**Date of Calibration:** 16 March 2022

Page 5 of 5

**Calibration point:** 16.0, 26.0 and 35.0 °C  
**Calibration result:**

- The probe was immersed in liquid bath or dry bath to a minimum depth of 120 mm.
- Description of probe, model : N/A SN : N/A
- Dimension of probe : Diameter 3.5 mm, Length 135 mm.
- Sheath material : Stainless Steel

UUC® Reading (°C)	Standard Temperature (°C)	Conversion Value (°C)	Uncertainty ± (°C)
15.2	15.001	-0.2	0.005
25.2	25.002	-0.2	0.006
35.2	35.002	-0.2	0.006

Note : -UUC® - Dry Under Calibration

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



# Accuracy Calibration Certificate

[illegible]

Manufacturer:	Master Toledo	Instrument Type:	Weighing Instrument
Model:	X9236DU	Asset Number:	LAE-WA-0102555
Serial No.:	C210885384	Terminal Model:	SPAT
Building:	N/A	Terminal Serial No.:	C210885384
Floor:	2	Terminal Asset No.:	N/A

Range	Max. Capacity	Readability (d)
1	51 g	0.00001 g
2	220 g	0.0001 g

Combination Curve: **EURAMET 99-18 v. 4.0 (11/2015)**  
CPM900/220  
METTLER TOLEDO Work Instruction

Temperature		Humidity	
A4 Found	Start: 22.4 °C End: 22.4 °C	Start: 47.5 % End: 48.2 %	

**Approved Signature**

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

Page 1 of 5

## เอกสารไม่ควบคุม

## เอกสารไม่ควบคุม

## Measurement Results

### Repeatability

Test Load: 70 g		As Found	As Left
1	70.00005 g	N/A	
2	70.00006 g	N/A	
3	70.00004 g	N/A	
4	70.00003 g	N/A	
5	70.00007 g	N/A	
6	70.00007 g	N/A	
7	70.00005 g	N/A	
8	70.00008 g	N/A	
9	70.00006 g	N/A	
10	70.00006 g	N/A	
Standard Deviation		0.000008 g	

The "g" in the graph represents the repeatability of the measurements in which the test was performed.  
The results of this graph are listed upon the absolute values of the differences from the mean value.

### Eccentricity

Test Load: 100 g		As Found	As Left
1	100.0000 g	N/A	
2	100.0000 g	N/A	
3	100.0000 g	N/A	
4	100.0000 g	N/A	
5	100.0000 g	N/A	
Maximum Deviation		0.0000 g	

The "g" in the graph represents the repeatability of the measurements in which the test was performed.

1	Od	Od	Od	Od
2	Od	Od	Od	Od

## Error of Indication

### As Found

Reference Value	Indication	Error of Indication	Expanded Uncertainty	k
1	0.00000 g	0.00000 g	0.0020 mg	2
2	0.05000 g	0.05001 g	0.00001 g	2
3	0.10000 g	0.10001 g	0.00000 g	2
4	1.00000 g	1.00001 g	0.00001 g	2
5	5.00001 g	5.00001 g	0.00000 g	2
6	20.00003 g	20.00002 g	0.00000 g	2
7	50.00000 g	50.00002 g	0.00002 g	2
8	60.00004 g	60.00000 g	0.00005 g	2
9	100.00000 g	100.00000 g	0.00000 g	2
10	150.00000 g	150.00000 g	0.00000 g	2
11	200.00000 g	199.99999 g	-0.00001 g	2

The calculated uncertainty was replaced by the CMC (Calibration and Measurement Capabilities) value because the calculated uncertainty was smaller than the CMC value.

As Found

As Left

For improved legibility of the graph, only increasing measurement points are shown and measurement points close to zero are not displayed.



The uncertainty stated is the expanded uncertainty at calibration obtained by multiplying the standard combined uncertainty by the coverage factor k - which can be larger than 2 according to EURAMET cp-18. The value of the measured lies within the assigned range of values with a probability of approximately 95%.

The user is responsible for maintaining environmental conditions and the settings of the weighing instrument when it was calibrated.

## Test Equipment

All weights used for metrological testing are traceable to national or international standards. The weights were calibrated and certified by an accredited calibration laboratory.

### Weight Set 1: OIML E2

Weight Set No.: W554

Date of Issue: 17-May-2020

Certificate Number: 170240

Calibration Due Date: 15-May-2022

### Thermo Hygrometer

Equipment No.: IN161

Date of Issue: 14-Jun-2021

Certificate Number: 21H1200

Calibration Due Date: 07-Jun-2022



Remarks

- FACT adjustment functionality activated
- Equipment condition: Good
- Calibration after installation
- Next calibration according to customer's procedure
- Calibration date not decide by calibration laboratory

End of Approved Section

The information below and any attachments to this calibration certificate are not part of the accredited calibration.

Measurement Uncertainty of the Weighing Instrument in Use

Stated is the expanded uncertainty with  $k=2$  in use. This formula shall be used for the evaluation of the uncertainty under consideration of the errors of indication. The value R represents the net load indication in the unit of measure of the device.

Temperature coefficient for the evaluation of the measurement uncertainty in use:  $1.5 \cdot 10^{-6} / K$

Temperature range on site for the evaluation of the measurement uncertainty in use: 3 K

Linearization of Uncertainty Equation

Range		As Found		As Left	
d	Max	U <sub>1</sub>	U <sub>2</sub>	U <sub>1</sub>	U <sub>2</sub>
1	0.0001 g	81 g	$U_1 = 0.021 \text{ mg} \pm 0.00450 \text{ mg/g} \cdot R$		N/A
2	0.001 g	220 g	$U_2 = 0.06 \text{ mg} \pm 0.00448 \text{ mg/g} \cdot R$		N/A

To optimize the stability of the linearization, besides of the zero load only increasing measurement points with a test load of 5% of the measurement range or larger are taken for the calculation of the linear equation.

Absolute and Relative Measurement Uncertainty in Use for Various Net Indications (Example)

Net Indication		As Found		As Left	
	0.00220 g	0.021 mg	0.95%	N/A	N/A
	0.02200 g	0.021 mg	0.095%	N/A	N/A
	0.22000 g	0.022 mg	0.0100%	N/A	N/A
	2.20000 g	0.031 mg	0.0014%	N/A	N/A
	220.0000 g	1.0 mg	0.00048%	N/A	N/A



The weighing range shown in the absolute uncertainty graph refers to the first interval/range of the device.

GWP®

# Certificate



As  
Found



As  
Left



The weighing device meets the given process requirements.

The weighing device meets the given process requirements.

Tests Performed:

☒ As Found

☐ As Left

No adjustments/modifications made. As Left results correspond to As Found.

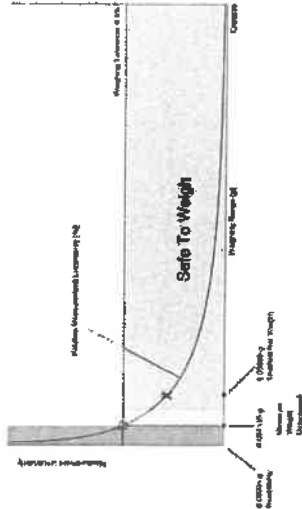
## Process Requirements

Weighing Tolerance: 0.5%

Smallest Net Weight: 0.05000 g

Safety Factor: 2

Safe Weighing Range



While the weighing has been carried out, the stated calibration results, the measurement uncertainty values are applied as stated. The graph reflects the left weighing, unless only As Found was performed.

## Minimum Weight As Found Minimum Weight Table

Range 1

Minimum weights for different weighing tolerances and safety factors					
Tolerance	Safety Factor				
	1	2	3	5	10
0.1%	0.020748 g	0.041087 g	0.062161 g	0.105659 g	0.216300 g
0.2%	0.010351 g	0.020749 g	0.031195 g	0.052228 g	0.105659 g
0.5%	0.004135 g	0.008277 g	0.012427 g	0.020749 g	0.041087 g
1%	0.002067 g	0.004135 g	0.006216 g	0.010351 g	0.020749 g
2%	0.001033 g	0.002067 g	0.003119 g	0.005179 g	0.010351 g
5%	0.000413 g	0.000826 g	0.001240 g	0.002067 g	0.004135 g

The minimum weight table applies to the fine range of the weighing device.

✓ Pass: The determined minimum weight meets the requirement for the smallest net weight.

## As Left Minimum Weight Table

Range 1

Minimum weights for different weighing tolerances and safety factors					
Tolerance	Safety Factor				
	1	2	3	5	10
0.1%	0.020748 g	0.041087 g	0.062161 g	0.105659 g	0.216300 g
0.2%	0.010351 g	0.020749 g	0.031195 g	0.052228 g	0.105659 g
0.5%	0.004135 g	0.008277 g	0.012427 g	0.020749 g	0.041087 g
1%	0.002067 g	0.004135 g	0.006216 g	0.010351 g	0.020749 g
2%	0.001033 g	0.002067 g	0.003119 g	0.005179 g	0.010351 g
5%	0.000413 g	0.000826 g	0.001240 g	0.002067 g	0.004135 g

The minimum weight table applies to the fine range of the weighing device.

✓ Pass: The determined minimum weight meets the requirement for the smallest net weight.

At these net minimum weight values, the measurement uncertainty of the weighing device is equal to or less than 1% (no safety factor), 1/2, 1/3, 1/5, or 1/10 of the required tolerance. The values are calculated with  $k = 2$  and based on the linear formula of the measurement uncertainty of the weighing device in use.

The safety factor for As Found is always 1. This implies no safety factor. As Found loading bolts at the bottom of the instrument from the past until test occurred. For the past, it is necessary to know that the tolerated test met, but not the safety factor. The safety factor is a protective measure to apply for future measurements.

Note on minimum weight values in above table:

1. If "N/A" is shown above, no appropriate value could be calculated.
2. METTLER TOLEDO is not responsible for the definition of the process requirements.

## Measurement Results

### Results Summary

	Repeatability	Eccentricity	Error of Indication
As Found	✓	✓	✓
As Left	✓	✓	✓

✓ = Passed

X = Failed

NA = Safety Factor not met

### Repeatability

Test Load: 70 g

Tolerance	Control Limit	As Found	As Left
0.1%	0.00025 g	Result	Result
0.2%	0.00050 g	✓	✓
0.5%	0.00125 g	✓	✓
1%	0.00250 g	✓	✓
2%	0.00500 g	✓	✓
5%	0.01250 g	✓	✓

The weighing tolerance is met if the standard deviation is less than or equal to the corresponding control limit.

### Eccentricity

Test Load: 100 g

Tolerance	Control Limit	As Found	As Left
0.1%	0.0003 g	Result	Result
0.2%	0.0006 g	✓	✓
0.5%	0.0015 g	✓	✓
1%	0.0030 g	✓	✓
2%	0.0060 g	✓	✓
5%	0.0150 g	✓	✓

The weighing tolerance is met if the deviation is less than or equal to the corresponding control limit.

### Error of Indication

As Found

Reference Value	Error	0.1%	0.2%	0.5%	1%	2%	5%
0.0000 g	0.0000 g	N/A	N/A	N/A	N/A	N/A	N/A
20.0000 g	0.0000 g	0.0100 g	0.0200 g	0.0500 g	0.1000 g	0.2000 g	0.5000 g
50.0000 g	0.0002 g	0.0250 g	0.0500 g	0.1250 g	0.2500 g	0.5000 g	1.2500 g
80.0000 g	0.0005 g	0.0400 g	0.0800 g	0.2000 g	0.4000 g	0.8000 g	2.0000 g
100.0000 g	0.0008 g	0.0500 g	0.1000 g	0.2500 g	0.5000 g	1.0000 g	2.5000 g
150.0000 g	0.0009 g	0.0750 g	0.1500 g	0.3750 g	0.7500 g	1.5000 g	3.7500 g
200.0000 g	-0.0001 g	0.1000 g	0.2000 g	0.5000 g	1.0000 g	2.0000 g	5.0000 g
Result		✓	✓	✓	✓	✓	✓

As Left

Reference Value	Error	0.1%	0.2%	0.5%	1%	2%	5%
0.0000 g	0.0000 g	N/A	N/A	N/A	N/A	N/A	N/A
20.0000 g	0.0000 g	0.0100 g	0.0200 g	0.0500 g	0.1000 g	0.2000 g	0.5000 g
50.0000 g	0.0002 g	0.0250 g	0.0500 g	0.1250 g	0.2500 g	0.5000 g	1.2500 g
80.0000 g	0.0005 g	0.0400 g	0.0800 g	0.2000 g	0.4000 g	0.8000 g	2.0000 g
100.0000 g	0.0005 g	0.0500 g	0.1000 g	0.2500 g	0.5000 g	1.0000 g	2.5000 g
150.0000 g	0.0009 g	0.0750 g	0.1500 g	0.3750 g	0.7500 g	1.5000 g	3.7500 g
200.0000 g	-0.0001 g	0.1000 g	0.2000 g	0.5000 g	1.0000 g	2.0000 g	5.0000 g
Result		✓	✓	✓	✓	✓	✓

The weighing tolerance is met if the error (of indication) for each test point is less than or equal to the corresponding control limit for that particular weighing tolerance. Results at or close to the zero point cannot be assessed.



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)  
CORPORATE SERVICES & EQUIPMENT CALIBRATION AND TESTING SERVICES  
3344 PATTANAKARN ROAD SOI 16, SUKHUMVIT, SUKHUMVIT BANGKOK 10250  
TEL. 0-2712-2000-27 FAX. 0-2719-4484



## Certificate of Calibration

Cert. No.: 21TM1876  
Page.: 1 of 3

Equipment : Hot Air Oven  
Manufacturer : Memmert  
Model : UF 55  
Serial No. : B216.1666  
ID No. : UAE.WAO.027/2559

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

Received Order : 29 October 2021  
Calibration Date : 29 October 2021  
Ambient Temperature :  $(26 \pm 10) ^\circ\text{C}$   
Relative Humidity :  $(50 \pm 30) \%$

Calibrated by : Kundhit Promrat

Approved by :  
( ) Ponthipha Taneyakul  
( ) Maies Butnuea  
( ) Suwit Injal

Issue Date : 4 November 2021

The Uncertainties are for a confidence probability of approximately 95%

This certificate may not be reproduced without the full, except with the prior written  
Approval of the head of Corporate Services, 3. Equipment Calibration and Testing Services

เอกสารนี้มีความลับ



Equipment : Hot Air Oven  
Condition As-Received : Used Item  
Reference : 2110-0701OC-1  
Procedure Used :-

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

The temperature scale used was based on ITS-90.

Condition of this result of calibration

1. Reference standard instrument:-

Instrument Model Serial No. Cert. No. Due Date  
1) Data Acquisition 34970A MY44067817 21LM10 20 Jul 2022

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

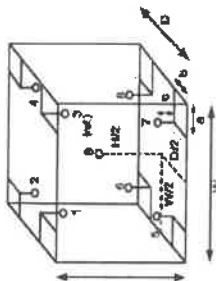
3. This certification is traceable to the International System of Unit.

Result of Calibration :- ( ) Without Adjustment

Function of UUC\* : Temperature Source

Fresh air setting : Close

Environment during calibration		
	Beginning	Finished
Temp. (°C)	28	28
REL.Humid. (%)	56	55
AC Supply (Volt)	230	230



Probe Installation Details :

a = 5.0 cm D = 0.33 m  
b = 5.0 cm W = 0.40 m  
c = 5.0 cm H = 0.40 m  
Capacity = 0.053 m<sup>3</sup>

Ref. Std. ID No.: @ Calibration Point		
Position : ( 140, 180 ) °C	( 104 ) °C	
1	21-15TC-01	15RTD2/11
2	21-15TC-02	15RTD2/12
3	21-15TC-03	15RTD2/13
4	21-15TC-04	15RTD2/14
5	21-15TC-05	15RTD2/15
6	21-15TC-06	15RTD2/20
7	21-15TC-07	15RTD2/17
8	21-15TC-08	15RTD2/18
9 (ref.)	21-15TC-09	15RTD2/19

หน้า 1

เอกสารนี้มีความลับ



Cert. No.: 21TM1876  
Page.: 3 of 3

Equipment : Hot Air Oven  
Condition As-Received : Used Item  
Reference : 2110-0701OC-1  
Result of Calibration :- ( ° ) Without Adjustment  
Function of UUC\* : Temperature Source  
Fresh air setting : Close

Calibration Point ( °C )	Measured Temperatures ( °C )						Overall Variation ( °C )	Uncertainty ( ± °C )	Coverage Factor k
	Position								
	1	2	3	4	5	6	7	8	9 (ref.)
104.0	103.852	103.978	104.382	104.323	103.776	104.015	104.312	104.196	103.907
140.0	140.309	140.730	140.426	140.270	139.531	139.595	140.067	139.695	139.750
180.0	180.598	180.339	180.755	180.619	179.716	179.829	180.204	180.365	179.975

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

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TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)  
CORPORATE SERVICES & EQUIPMENT CALIBRATION AND TESTING SERVICES  
53441 PATTANAKARN ROAD SOI 18, SUWANKLANG, SUWANKLANG BANGKOK 10250  
TEL. 0-2717-3091-27 FAX. 0-2719-9184



Cert. No.: 22TM80  
Page.: 1 of 3

## Certificate of Calibration

Equipment : BOD Incubator  
Manufacturer : Anco  
Model : UC4-1320  
Serial No. : 13URC49013201  
ID No. : UAE.WAO.015/2561

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

Received Order : 17 February 2022  
Calibration Date : 17 February 2022  
Ambient Temperature : ( 26 ± 10 ) °C  
Relative Humidity : ( 50 ± 30 ) %

Calibrated by : Kunchit Promprai

Approved by :

( / ) Pornthappa Taneyakul  
( / ) Maice Butruosa  
( ) Suwit Imjai

Issue Date : 22 February 2022

The Uncertainties are for a confidence probability of approximately 95%

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Approval of the Head of Corporate Services, 3 Equipment Calibration and Testing Services

เอกสารไม่ควบคุม  
เอกสารไม่ควบคุม  
A 00380099



๒๕๐๘ วิทยาลัยการศึกษาระดับมัธยมศึกษาตอนต้น กรุงเทพมหานคร  
๒๕๑๓-๒๕๑๔ โรงเรียนสตรีศรีสุริโยทัย กรุงเทพมหานคร  
๒๕๑๖-๒๕๑๗ โรงเรียนสตรีศรีสุริโยทัย กรุงเทพมหานคร



มูลนิธิศูนย์มาตรฐาน  
อุตสาหกรรม  
Foundation for Industrial Development National Food Institute  
Food Industrial Laboratory Service Center



## Calibration Report

Certificate No.: 2203120-001-01  
Equipment: Electronic Balance  
Manufacturer: METTLER TOLEDO  
Model: AG204-S/FACT  
Resolution: 0.0001 g  
Serial No.: 1126301010  
ID No.: DME.WAS.002/2552  
Capacity: 220 g

Date of Calibration: 1 June 2022 Page 3 of 3

### Calibration Results: (Continued)

Calibration Range: 0 - 200 g

Calibration Adjustments: Internal Calibration

3. Departure from Nominal Value:

Nominal Value (g)	Standard Value (g)	Average Reading (g)	Correction (g)	Uncertainty (± g)	Coverage Factor k
Unload	0.0000	0.0000	0.0000	0.000008	2.00
0.01	0.01000	0.0100	0.0000	0.000008	2.00
0.05	0.05000	0.0499	0.0001	0.000008	2.00
0.1	0.10000	0.1000	0.0000	0.000008	2.00
0.2	0.20000	0.2000	0.0000	0.000008	2.00
0.5	0.50000	0.5000	0.0000	0.000008	2.00
1	1.00000	0.9999	0.0001	0.000008	2.00
2	2.00000	1.9999	0.0001	0.000008	2.00
5	5.00000	5.0000	0.0000	0.000008	2.00
10	9.99995	9.9999	0.0001	0.000008	2.00
20	19.99999	19.9999	0.0001	0.000004	7.00
50	49.99990	49.9999	0.0000	0.00012	2.00
70	69.99989	69.9998	0.0001	0.00014	2.00
100	100.00001	99.9999	0.0001	0.00017	2.00
150	149.99991	149.9997	0.0002	0.00022	2.00
200	200.00007	199.9996	0.0001	0.00030	2.00

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

End

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