

**เอกสารแบบ 22**  
**เอกสารอนุญาตห้องปฏิบัติการ**



ที่ อก ๐๓๑๐(๑)/ ๒ ๒ ๔ ๓

กรมโรงงานอุตสาหกรรม  
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท  
เขตราชเทวี กรุงเทพฯ ๑๐๐๐

๓ ๑ มกราคม ๒๕๖๖

เรื่อง ข้ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน  
เรียน กรรมการผู้จัดการ บริษัท ตรวาล์วดีสิ่งแวดล้อม จำกัด  
อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารเคมีของห้องปฏิบัติการวิเคราะห์เอกชน  
ลงวันที่ ๘ ธันวาคม ๒๕๖๕  
สิ่งที่ส่งมาด้วย เอกสารแนบท้ายหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน  
บริษัท ตรวาล์วดีสิ่งแวดล้อม จำกัด จำนวน ๑ แผ่น

ตามหนังสือที่อ้างถึง บริษัท ตรวาล์วดีสิ่งแวดล้อม จำกัด ขอต่ออายุหนังสือรับขึ้นทะเบียน  
ห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ๖-๓๐๑ สถานที่ตั้งเลขที่ ๕/๔๕ หมู่บ้าน บ้านกลางกรุง บึงขาคำน  
ซอยศรีนครินทร์ ๔๖/๑ (ปราโมทย์) แขวงหนองบอน เขตประเวศ กรุงเทพมหานคร ดอกรมโรงงานอุตสาหกรรม นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้บริษัท ตรวาล์วดีสิ่งแวดล้อม จำกัด ต่ออายุหนังสือรับขึ้น  
ทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน โดยมีองค์ประกอบดังนี้  
ก. ผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์

ทะเบียนเลขที่ ๖-๓๐๑

ข. เจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์

ทะเบียนเลขที่ ๖-๓๐๑

ทะเบียนเลขที่ ๖-๓๐๑

ทะเบียนเลขที่ ๖-๓๐๑

ทะเบียนเลขที่ ๖-๓๐๑

ค. ขอบข่ายสารเคมีที่ได้รับขึ้นทะเบียนไว้วิเคราะห์นั้นเสีย ตามสิ่งที่ส่งมาด้วย

หนังสือฉบับนี้จะหมดอายุในวันที่ ๓ มกราคม ๒๕๖๖ หากประสงค์จะต่ออายุหนังสือ  
รับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน ให้ยื่นคำขอต่ออายุพร้อมเอกสารประกอบคำขอต่อ  
กรมโรงงานอุตสาหกรรม ภายใน ๓๐ วัน ก่อนวันสิ้นสุดของหนังสือขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน  
ทั้งนี้ สามารถยื่นคำขอผ่านระบบอิเล็กทรอนิกส์ได้ทั้งทางเว็บไซต์กรมโรงงานอุตสาหกรรม ตาม QR Code  
ท้ายหนังสือฉบับนี้

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

ผู้อำนวยการโรงงานและผู้อำนวยการ  
ผู้บริหารการแทนอธิบดีกรมโรงงานอุตสาหกรรม



กองวิจัยและเตือนภัยมลพิษโรงงาน

กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษและทะเบียนห้องปฏิบัติการ

โทร. ๐ ๒๕๓๐ ๖๓๑๒ ต่อ ๒๑๐๓-๕

โทรสาร ๐ ๒๕๓๐ ๖๓๑๒ ต่อ ๒๑๕๕

ไปรษณีย์อิเล็กทรอนิกส์ saraban@diw.mail.go.th

กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษและทะเบียนห้องปฏิบัติการ กองวิจัยและเตือนภัยมลพิษโรงงาน กรมโรงงานอุตสาหกรรม โทร. ๐ ๒๕๓๐ ๖๓๑๒ ต่อ ๒๑๐๓-๕



"อุตสาหกรรมก้าวหน้า ร่วมกันพัฒนา อุตสาหกรรมสีเขียว"

ที่ อก ๐๓๑๐(๑)/ ๖ ๐ ๙ ๒



กรมโรงงานอุตสาหกรรม  
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท  
เขตราชเทวี กรุงเทพฯ ๑๐๔๐๐

## ๒ ๒ กรกฎาคม ๒๕๖๕

เรื่อง เปลี่ยนแปลงบุคลากรของห้องปฏิบัติการวิเคราะห์  
เรียน กรรมการผู้จัดการ บริษัท ดรรจด์สิ่งแวดล้อม จำกัด  
อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารเคมีของห้องปฏิบัติการวิเคราะห์เอกชน  
ลงวันที่ ๑๕ กรกฎาคม ๒๕๖๕

ตามคำขอที่อ้างถึง บริษัท ดรรจด์สิ่งแวดล้อม จำกัด ห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ๖-๓๐๑ สภามที่ดั่งเลขที่ ๕/๕๕ หมู่บ้าน บ้านกลางกรุง บิซทาวน์ ซอยศรีนครินทร์ ๕๖/๑(ปราโมทย์) เขตปทุมวัน กรุงเทพมหานคร ขอเปลี่ยนแปลงบุคลากร ความละเอียดแล้วแล้ว นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว มีความเห็นดังนี้

๑. ให้ยกเลิกเจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๒ ราย  
ทะเบียนเลขที่ ๖-๓๐๑-๑  
ทะเบียนเลขที่ ๖-๓๐๑-๑
๒. ให้เพิ่มผู้ควบคุมห้องปฏิบัติการวิเคราะห์เอกชน จำนวน ๒ ราย  
ทะเบียนเลขที่ ๖-๓๐๑-๑  
ทะเบียนเลขที่ ๖-๓๐๑-๑
๓. ให้เพิ่มเจ้าหน้าที่ห้องปฏิบัติการวิเคราะห์เอกชน จำนวน ๑ ราย  
ทะเบียนเลขที่ ๖-๓๐๑-๑

อนึ่ง หนังสือฉบับนี้ส่งอายุพร้อมหนังสือตอบรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน  
ในวันที่ ๓ มกราคม ๒๕๖๕

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

ผู้อำนวยการวิจัยและเตือนภัยมลพิษโรงงาน  
ปฏิบัติราชการแทนอธิบดีกรมโรงงานอุตสาหกรรม

กองวิจัยและเตือนภัยมลพิษโรงงาน

กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษและทะเบียนห้องปฏิบัติการ

โทร. ๐ ๒๕๓๐ ๖๓๑๒ ต่อ ๒๑๐๓-๕

โทรสาร ๐ ๒๕๓๐ ๖๓๑๒ ต่อ ๒๑๕๙

ไปรษณีย์อิเล็กทรอนิกส์ saraban@diw.mail.go.th



“อุตสาหกรรมก้าวไกล ประเทศไทยก้าวหน้า ร่วมกันพัฒนา อุตสาหกรรมสีเขียว”



ที่ อก ๐๓๑๐(๑)/๑๐๔๘ ๖



กรมโรงงานอุตสาหกรรม  
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท  
เขตราชเทวี กรุงเทพฯ ๑๐๔๐๐

## ๑๗ ตุลาคม ๒๕๖๗

เรื่อง ยกเลิกบุคลากรของห้องปฏิบัติการวิเคราะห์  
เรียน กรรมการผู้จัดการ บริษัท ดรรจด์สิ่งแวดล้อม จำกัด  
อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารเคมีของห้องปฏิบัติการวิเคราะห์เอกชน  
ลงวันที่ ๑ ตุลาคม ๒๕๖๗

ตามคำขอที่อ้างถึง บริษัท ดรรจด์สิ่งแวดล้อม จำกัด ห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ๖-๓๐๑ สภามที่ดั่งเลขที่ ๕/๕๕ หมู่บ้าน บ้านกลางกรุง บิซทาวน์ ซอยศรีนครินทร์ ๕๖/๑(ปราโมทย์) เขตปทุมวัน กรุงเทพมหานคร ขอยกเลิกบุคลากร ความละเอียดแล้วแล้ว นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้ยกเลิกเจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์  
จำนวน ๑ ราย ได้แก่ น

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

รองอธิบดี ปฏิบัติราชการแทน  
อธิบดีกรมโรงงานอุตสาหกรรม

กองวิจัยและเตือนภัยมลพิษโรงงาน

กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษและทะเบียนห้องปฏิบัติการ

โทร. ๐ ๒๕๓๐ ๖๓๑๒ ต่อ ๒๑๐๓-๕

โทรสาร ๐ ๒๕๓๐ ๖๓๑๒ ต่อ ๒๑๕๙

ไปรษณีย์อิเล็กทรอนิกส์ saraban@diw.mail.go.th



“อุตสาหกรรมก้าวไกล ประเทศไทยก้าวหน้า ร่วมกันพัฒนา อุตสาหกรรมสีเขียว”





เลขที่ 43/2569

## หนังสือรับรองการขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

กรมโรงงานอุตสาหกรรม ออกหนังสือฉบับนี้เพื่อ ต่ออายุ ให้  
บริษัท ตรวจวดีสิ่งแวดลอม จำกัด

ห้องปฏิบัติการวิเคราะห์เอกชนเลขทะเบียน ว-301

สถานที่ตั้งห้องปฏิบัติการ  
เลขที่ 5/45 หมู่บ้านบางกลางท่ง ปิณฑาวน ซอยศรีนครินทร์ 46/1 (ปราโมทย์)  
แขวงหนองบอน เขตประเวศ กรุงเทพมหานคร

โดยมีรายละเอียดผู้ควบคุมห้องปฏิบัติการวิเคราะห์เอกชน เจ้าหน้าที่ห้องปฏิบัติการวิเคราะห์เอกชน  
และขอขอบข่ายชนิดสารมลพิษ ดังเอกสารแนบ

ออกให้ ณ วันที่ 10 กุมภาพันธ์ 2569

หมดอายุวันที่ 3 มกราคม 2573

ทดสอบระบบ

ผู้อำนวยการกองวิจัยและเตือนภัยมลพิษโรงงาน  
ปฏิบัติราชการแทนอธิบดีกรมโรงงานอุตสาหกรรม

หนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชนฉบับนี้อาจถูกเพิกถอนได้ตามเงื่อนไขของข้อ 22  
หมวด 6 แห่งประกาศกรมโรงงานอุตสาหกรรม เรื่อง ห้องปฏิบัติการวิเคราะห์เอกชน พ.ศ. 2566



5362499



ที่ อก ๐๓๑๐(๑)/ ๖๗ ๓ ๓

กรมโรงงานอุตสาหกรรม  
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท  
เขตราชเทวี กรุงเทพฯ ๑๐๔๐๐

๑๕ สิงหาคม ๒๕๖๘

เรื่อง ยกเลิกบุคลากรของห้องปฏิบัติการวิเคราะห์  
เรียน กรรมการผู้จัดการ บริษัท ตรวจวดีสิ่งแวดลอม จำกัด  
อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกชน  
ลงวันที่ ๑ สิงหาคม ๒๕๖๘

ตามคำขอที่อ้างถึง บริษัท ตรวจวดีสิ่งแวดลอม จำกัด ห้องปฏิบัติการวิเคราะห์เอกชน  
เลขทะเบียน ว-๓๐๑ สถานที่ตั้งเลขที่ ๕/๔๕ หมู่บ้าน บางกลางท่ง ปิณฑาวน ซอยศรีนครินทร์ ๔๖/๑(ปราโมทย์)  
แขวงหนองบอน เขตประเวศ กรุงเทพมหานคร ขอยกเลิกบุคลากร ความละเอียดแล้ว นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้ยกเลิกผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์  
จำนวน ๑ ราย ได้แก่  
ทะเบียนเลขที่ ว-๓๐๑

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

ผู้อำนวยการกองวิจัยและเตือนภัยมลพิษโรงงาน  
ปฏิบัติราชการแทนอธิบดีกรมโรงงานอุตสาหกรรม

กองวิจัยและเตือนภัยมลพิษโรงงาน  
กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษและทะเบียนห้องปฏิบัติการ  
โทร. ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๐๓-๕  
โทรสาร ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๙๙  
ไปรษณีย์อิเล็กทรอนิกส์ saraban@diw.mail.go.th



“อุตสาหกรรมก้าวไกล ประเทศไทยก้าวหน้า ร่วมกันพัฒนา อุตสาหกรรมสีเขียว”



Lab regis-2

บุคลากรประจำห้องปฏิบัติการ

เจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์เอกชน

ชื่อห้องปฏิบัติการ

บริษัท ตรวจวัดสิ่งแวดล้อม จำกัด

เลขทะเบียน

จ-301

สถานที่ตั้งห้องปฏิบัติการ

เลขที่ 5/45 หมู่บ้านบ้านกลางกรุง บึงหวางน้ ขยศรีนครินทร์ 46/1 (ปราโมทย์)

แขวงหนองบอน เขตประเวศ กรุงเทพมหานคร

วันที่ออกหนังสือรับขึ้นทะเบียนห้องปฏิบัติการ

10 กุมภาพันธ์ 2569

วันที่หมดอายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการ

3 มกราคม 2573

รายชื่อเจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์เอกชน ณ วันที่ออกใบรับรอง

| ชื่อ-สกุล | ทะเบียนเลขที่ |
|-----------|---------------|
|           | จ-301-        |
|           | จ-301-        |
|           | จ-301-        |

MM-C35

น.22/4

ใช้ประกอบหนังสือรับรองการขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน เลขที่ 43/2569

กรมโรงงานอุตสาหกรรม

รับรองข้อมูล ณ วันที่ 10 กุมภาพันธ์ 2569

1/1



Lab regis-1

บุคลากรประจำห้องปฏิบัติการ

ผู้ควบคุมห้องปฏิบัติการวิเคราะห์เอกชน

ชื่อห้องปฏิบัติการ

บริษัท ตรวจวัดสิ่งแวดล้อม จำกัด

เลขทะเบียน

จ-301

สถานที่ตั้งห้องปฏิบัติการ

เลขที่ 5/45 หมู่บ้านบ้านกลางกรุง บึงหวางน้ ขยศรีนครินทร์ 46/1 (ปราโมทย์)

แขวงหนองบอน เขตประเวศ กรุงเทพมหานคร

วันที่ออกหนังสือรับขึ้นทะเบียนห้องปฏิบัติการ

10 กุมภาพันธ์ 2569

วันที่หมดอายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการ

3 มกราคม 2573

รายชื่อผู้ควบคุมห้องปฏิบัติการวิเคราะห์เอกชน ณ วันที่ออกใบรับรอง

| ชื่อ-สกุล | ทะเบียนเลขที่ |
|-----------|---------------|
|           | จ-30          |
|           | จ-30          |

ใช้ประกอบหนังสือรับรองการขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน เลขที่ 43/2569

กรมโรงงานอุตสาหกรรม

รับรองข้อมูล ณ วันที่ 10 กุมภาพันธ์ 2569

1/1



ขอป่วยและขนิสารลพิทที่ไ้รับการขึ้นทะเบียน

ชื่อห้องปฏิบัติการ บริษัท ตรวจจับสิ่งแวดล้อม จำกัด  
เลขทะเบียน ว-301  
สถานที่ตั้งห้องปฏิบัติการ เลขที่ 5/45 หมู่บ้านบ้านกลางกรุง บึงทาวน์ ขอยศรีนครินทร์ 46/1 (ปราโมทย์)  
แขวงหนองบอน เขตประเวศ กรุงเทพมหานคร  
วันที่ออกหนังสือรับขึ้นทะเบียนห้องปฏิบัติการ 10 กุมภาพันธ์ 2569  
วันที่หมดอายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการ 3 มกราคม 2573

| ขอป่วย               | สารลพิท                                                                                                              | วิธีวิเคราะห์                                                                                                                                              |
|----------------------|----------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| น้ำ/น้ำเสีย 5 รายการ | 1. Biochemical Oxygen Demand<br>2. Oil and Grease<br>3. pH<br>4. Total Dissolved Solids<br>5. Total Suspended Solids | 5-Day BOD Test, Membrane-Electrode Method<br>Liquid-Liquid, Partition-Gravimetric Method<br>Electrometric Method<br>Dried at 180 °C<br>Dried at 103-105 °C |

เอกสารอ้างอิง

1. APHA, AWWA, WEF. Standard Methods for the Examination of Water and Wastewater. 23rd ed. Washington, DC: APHA, 2017.



ใช้ประกอบหนังสือรับรองการขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน เลขที่ 43/2569  
กรมโรงงานอุตสาหกรรม  
รับรองข้อมูล ณ วันที่ 10 กุมภาพันธ์ 2569  
1/1

หนังสือบันทึกการเปลี่ยนแปลง

ชื่อห้องปฏิบัติการ บริษัท ตรวจจับสิ่งแวดล้อม จำกัด  
เลขทะเบียน ว-301  
สถานที่ตั้งห้องปฏิบัติการ เลขที่ 5/45 หมู่บ้านบ้านกลางกรุง บึงทาวน์ ขอยศรีนครินทร์ 46/1 (ปราโมทย์)  
แขวงหนองบอน เขตประเวศ กรุงเทพมหานคร  
วันที่ออกหนังสือรับขึ้นทะเบียนห้องปฏิบัติการ 10 กุมภาพันธ์ 2569  
วันที่หมดอายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการ 3 มกราคม 2573

| ลำดับที่ | สาระสำคัญของการเปลี่ยนแปลง | ผู้บันทึก |
|----------|----------------------------|-----------|
| 1        | ขอต่ออายุทะเบียน           |           |

ใช้ประกอบหนังสือรับรองการขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน เลขที่ 43/2569  
กรมโรงงานอุตสาหกรรม  
รับรองข้อมูล ณ วันที่ 10 กุมภาพันธ์ 2569



List Certificate of Instrument for Environmental Quality Analysis.

| No.                                      | Instrument/Equipment                                   | Parameter                                                                | Manufacturer         | Model/Serial No.                         | Calibrator                                                          | Certification No.                              | Date of Calibration | Due date of Calibration* | Remark |
|------------------------------------------|--------------------------------------------------------|--------------------------------------------------------------------------|----------------------|------------------------------------------|---------------------------------------------------------------------|------------------------------------------------|---------------------|--------------------------|--------|
| เครื่องมือสำหรับวิเคราะห์คุณภาพน้ำและดิน |                                                        |                                                                          |                      |                                          |                                                                     |                                                |                     |                          |        |
| 1                                        | UV-VIS Spectrophotometer                               | Color (ADMI), Fluoride                                                   | Agilent Technologies | Cary60 G6860A / MY15410009               | DQE Services Co.,Ltd.                                               | SP25 019                                       | 26 May 25           | 25 May 26                | -      |
| 2                                        | UV-VIS Spectrophotometer                               | Sulfate, Phosphorus<br>Nitrogen-Ammonia<br>Nitrogen-Nitrate              | Hitachi              | U-5100 / Z3A4-008                        | DQE Services Co.,Ltd.                                               | SP25-024                                       | 17 Jun 25           | 16 Jun 26                | -      |
| 3                                        | COD Reactor (Heating Block)                            | Chemical Oxygen Demand (COD)                                             | Hanna                | HI839800-02 / H018500I                   | Hanna Instruments (Thailand) Ltd.                                   | HIT-2510-0375                                  | 7 Mar 25            | 6 Mar 26                 | -      |
| 4                                        | Cyanuric Acid Portable Photometer                      | Cyanuric acid                                                            | Hanna                | HI97722C / 905060058111                  | Hanna Instruments (Thailand) Ltd.                                   | HIT-2513-0437                                  | 24 Mar 25           | 23 Mar 26                | -      |
| 5                                        | Atomic Absorption Spectrophotometer (AAS)              | Arsenic, Cadmium ,Chromium<br>Copper, Iron, Manganese<br>Zinc, Potaasium | Agilent Technologies | System ID:G8432A<br>AA240FS / MY13160001 | Thailand Institute of Scientific and Technological Research (TISTR) | MTCACL.No.372/68                               | 3 Feb 25            | 2 Feb 26                 | -      |
| 6                                        | Atomic Absorption Spectrophotometer (AAS)              | Calcium, Lead, Mercury                                                   | Perkin Elmer         | PinAAcle 900F / PFB520031902             | Perkin Elmer Co.,Ltd.                                               | PinAAcle 900F<br>Preventive Maintenance Report | 29 Apr 25           | 28 Apr 26                | -      |
| 7                                        | Inductively Coupled Plasma (ICP)                       |                                                                          | Agilent Technologies | System ID:G8015A<br>G8015AA / MY18030001 | Agilent Technologies (Thailand) Co.,Ltd.                            | Preventive Maintenance Checklist               | 3 Nov 25            | 2 Nov 26                 | -      |
| 8                                        | Cold Vapor Atomic Absorption Spectrophotometer (CVAAS) | Mercury(ดิน)                                                             | MILESTONE            | DMA-80 / 24114043                        | Sithiporn Associates Co.,Ltd.                                       | Service Protocol Report                        | 31 Jan 25           | 30 Jan 26                | -      |
| 9                                        | Digestor Unit                                          | Total Kjeldahl Nitrogen                                                  | FOSS<br>TECATOR      | DT2520 / 9190506                         | National Food Institute,<br>Ministry of Industry, Thailand          | 2501440-001-01                                 | 27 Jan 25           | 26 Jan 26                | -      |
| 10                                       | Distillation Unit (Kjeldahl Method)                    |                                                                          | FOSS<br>TECATOR      | KT9 / 91905393                           | FOSS South East Asia                                                | 13851                                          | 25 Feb 25           | 24 Feb 26                | -      |

เอกสารไม่ควบคุม

List Certificate of Instrument for Environmental Quality Analysis.

| No.                                      | Instrument/Equipment | Parameter                                       | Manufacturer | Model/Serial No.    | Calibrator                                                 | Certification No. | Date of Calibration | Due date of Calibration* | Remark |
|------------------------------------------|----------------------|-------------------------------------------------|--------------|---------------------|------------------------------------------------------------|-------------------|---------------------|--------------------------|--------|
| เครื่องมือสำหรับวิเคราะห์คุณภาพน้ำและดิน |                      |                                                 |              |                     |                                                            |                   |                     |                          |        |
| 11                                       | Incubator            | Total Bacteria<br>Total Coliform Bacteria       | Memmert      | IPP 260 / V615.0187 | National Food Institute,<br>Ministry of Industry, Thailand | 2502229-001-01    | 19 Mar 25           | 18 Mar 26                | -      |
| 12                                       | Incubator            | Fecal Coliform Bacteria<br>Escherichia coli     | Memmert      | IPP 260 / V618.0033 | National Food Institute,<br>Ministry of Industry, Thailand | 2502229-003-01    | 19 Mar 25           | 18 Mar 26                | -      |
| 13                                       | Water Bath           | Pseudomonas Aeruginosa<br>Staphylococcus Aureus | Memmert      | WNE 14 / L416.0606  | National Food Institute,<br>Ministry of Industry, Thailand | 2501624-001-01    | 10 Feb 25           | 9 Feb 26                 | -      |
| 14                                       | Water Bath           |                                                 | Memmert      | WNE 14 / L416.0612  | National Food Institute,<br>Ministry of Industry, Thailand | 2501624-002-01    | 10 Feb 25           | 9 Feb 26                 | -      |
| 15                                       | Auto Clave           |                                                 | ALP          | CL-40L / 808763     | National Food Institute,<br>Ministry of Industry, Thailand | 2502229-007-01    | 19 Mar 25           | 18 Mar 26                | -      |
| 16                                       | Auto Clave           |                                                 | ALP          | CL-40L / 810010     | National Food Institute,<br>Ministry of Industry, Thailand | 2503287-001-01    | 5 Jun 25            | 4 Jun 26                 | -      |
| 17                                       | Analytical Balance   |                                                 | OHAUS        | PX623 / C236754745  | National Food Institute,<br>Ministry of Industry, Thailand | 2502227-001-01    | 19 Mar 25           | 18 Mar 26                | -      |

Due Date of Calibration\* : Based on the annual calibration plan. At least 1 time per year.

เอกสารไม่ควบคุม

REPORT OF CALIBRATION

Certificate No. : SP25-019

Page 2 of 5

Environment Condition : Ambient Temperature 25 ± 5 °C

Relative humidity 55 ± 20 %RH

Calibration method : In-house method CP-01 Based on ASTM E275-08

Certified Reference Materials :

| Material                | Serial No. | Certificate No. | Due date        |
|-------------------------|------------|-----------------|-----------------|
| Absorbance Standard set | 25760      | 115663          | 25 October 2025 |
| Absorbance Standard set | 25757      | 115638          | 25 October 2025 |
| Wavelength Standard set | 25806      | 115657          | 25 October 2025 |
| Wavelength Standard set | 25758      | 115665          | 25 October 2025 |

Traceability : This certification is traceable to the International System of Unit maintained at National -

Institute of Standards and Technology (NIST) through Siarna Scientific Limited

Spectral Band Width of UUC : 1.5 nm.

Scan Speed of UUC : 60 nm/min

Scan Interval of UUC : 0.15 nm.

Resolution of UUC : Photometric 0.0001 Abs.

Wavelength 0.1 nm.

CERTIFICATE OF CALIBRATION

Certificate No. : SP25-019

Page 1 of 5

Customer : United Analyst and Engineering Consultant Co.,Ltd. (Head Office)

Address : 3 Soi Udomsuk 41, Sukhumvit Road, Bangchak, Phrakhanong, Bangkok 10260

Location of calibration : Instrument room (207)

Equipment : UV-Vis Spectrophotometer

Manufacturer : Agilent Technologies

Model : Cary 60

Serial No. : MY15410009

ID No. : UAE.WAT.020/2558

Received Date : 26 May 2025

Calibration Date : 26 May 2025

Issue Date : 29 May 2025

Condition Instrument : Good

Calibrated by

Approved by :

Technical Manager

Quality Manager

The calibration result is applied only to the above calibrated item and was found accurate as shown on date and place of calibration only.

The measurement capability of the laboratory and its traceability to recognized national standards and to the unit of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the DQE Services Co., Ltd.

## REPORT OF CALIBRATION

Certificate No. : SP25-019

Page 4 of 5

Photometric Accuracy :

| Wavelength<br>(nm.) | CRMs Values<br>(Abs) | UUC Reading<br>(Abs) | Correction<br>(Abs) | Uncertainty<br>(Abs) | Coverage factor<br><i>k</i> |
|---------------------|----------------------|----------------------|---------------------|----------------------|-----------------------------|
| 235                 | 0.0000<br>0.7469     | 0.0000<br>0.7488     | 0.0000<br>-0.0019   | 0.0050<br>0.0063     | 2.00<br>2.00                |
| 257                 | 0.0000<br>0.8674     | 0.0000<br>0.8663     | 0.0000<br>0.0011    | 0.0050<br>0.0067     | 2.00<br>2.00                |
| 313                 | 0.0000<br>0.2919     | 0.0000<br>0.2902     | 0.0000<br>0.0017    | 0.0050<br>0.0052     | 2.00<br>2.00                |
| 350                 | 0.0000<br>0.6430     | 0.0000<br>0.6428     | 0.0000<br>0.0002    | 0.0050<br>0.0063     | 2.00<br>2.00                |

## REPORT OF CALIBRATION

Certificate No. : SP25-019

Page 3 of 5

Calibration Results : Without adjustment

Photometric Accuracy :

| Wavelength<br>(nm.) | CRMs Values<br>(Abs)                 | UUC Reading<br>(Abs)                 | Correction<br>(Abs)                   | Uncertainty<br>(Abs)                 | Coverage factor<br><i>k</i>  |
|---------------------|--------------------------------------|--------------------------------------|---------------------------------------|--------------------------------------|------------------------------|
| 420                 | 0.0000<br>0.5780<br>1.0484<br>2.1876 | 0.0000<br>0.5739<br>1.0430<br>2.1876 | 0.0000<br>0.0041<br>0.0054<br>0.0000  | 0.0028<br>0.0031<br>0.0029<br>0.0084 | 2.00<br>2.00<br>2.00<br>2.00 |
| 440                 | 0.0000<br>0.5595<br>1.0239<br>2.1230 | 0.0000<br>0.5581<br>1.0219<br>2.1207 | 0.0000<br>0.0014<br>0.0020<br>0.0023  | 0.0028<br>0.0034<br>0.0035<br>0.0085 | 2.00<br>2.00<br>2.00<br>2.00 |
| 465                 | 0.0000<br>0.5230<br>0.9633<br>1.9753 | 0.0000<br>0.5190<br>0.9609<br>1.9719 | 0.0000<br>0.0040<br>0.0024<br>0.0034  | 0.0028<br>0.0029<br>0.0029<br>0.0079 | 2.00<br>2.00<br>2.00<br>2.00 |
| 546.1               | 0.0000<br>0.5181<br>1.0002<br>1.9973 | 0.0000<br>0.5161<br>0.9979<br>2.0021 | 0.0000<br>0.0020<br>0.0023<br>-0.0048 | 0.0028<br>0.0031<br>0.0033<br>0.0102 | 2.00<br>2.00<br>2.00<br>2.00 |
| 590                 | 0.0000<br>0.5517<br>1.0803<br>2.0373 | 0.0000<br>0.5503<br>1.0808<br>2.0324 | 0.0000<br>0.0014<br>-0.0005<br>0.0049 | 0.0028<br>0.0030<br>0.0031<br>0.0105 | 2.00<br>2.00<br>2.00<br>2.00 |
| 635                 | 0.0000<br>0.5591<br>1.0518<br>1.9274 | 0.0000<br>0.5583<br>1.0513<br>1.9281 | 0.0000<br>0.0008<br>0.0005<br>-0.0007 | 0.0028<br>0.0031<br>0.0030<br>0.0102 | 2.00<br>2.00<br>2.00<br>2.00 |

FM-708-02 R01 1/11/2021



| <div>  <div> DQE Services Co.,Ltd.<br/> 32 Soi Ladprao-Wanghin 55, Ladprao-Wanghin Rd., Ladprao, Bangkok 10230<br/> Phone : +66 (0)2 538 2054, Email : dqeservicesinfo@gmail.com </div> </div>                                                                                                             |                      |                     |                      |                             |  |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|---------------------|----------------------|-----------------------------|--|
| <div> <div>  <div> DQE Services Co.,Ltd.<br/> 32 Soi Ladprao-Wanghin 55, Ladprao-Wanghin Rd., Ladprao, Bangkok 10230<br/> Phone : +66 (0)2 538 2054, Email : dqeservicesinfo@gmail.com </div> </div> </div>                                                                                                |                      |                     |                      |                             |  |
| <div> <div> <div>REPORT OF CALIBRATION</div> <div> Certificate No. : SP25-024 </div> <div> Wavelength Accuracy : </div> </div> <div> <div>Page 5 of 5</div> </div> </div>                                                                                                                                                                                                                    |                      |                     |                      |                             |  |
| CRMs Values<br>(nm.)                                                                                                                                                                                                                                                                                                                                                                         | UUC Reading<br>(nm.) | Correction<br>(nm.) | Uncertainty<br>(nm.) | Coverage factor<br><i>k</i> |  |
| 241.00                                                                                                                                                                                                                                                                                                                                                                                       | 240.4                | 0.60                | 0.18                 | 2.00                        |  |
| 279.30                                                                                                                                                                                                                                                                                                                                                                                       | 278.8                | 0.50                | 0.18                 | 2.00                        |  |
| 288.90                                                                                                                                                                                                                                                                                                                                                                                       | 288.3                | 0.60                | 0.18                 | 2.00                        |  |
| 334.50                                                                                                                                                                                                                                                                                                                                                                                       | 333.9                | 0.60                | 0.18                 | 2.00                        |  |
| 361.40                                                                                                                                                                                                                                                                                                                                                                                       | 360.8                | 0.60                | 0.18                 | 2.00                        |  |
| 418.40                                                                                                                                                                                                                                                                                                                                                                                       | 417.9                | 0.50                | 0.18                 | 2.00                        |  |
| 447.20                                                                                                                                                                                                                                                                                                                                                                                       | 446.6                | 0.60                | 0.18                 | 2.00                        |  |
| 459.30                                                                                                                                                                                                                                                                                                                                                                                       | 459.1                | 0.20                | 0.18                 | 2.00                        |  |
| 537.00                                                                                                                                                                                                                                                                                                                                                                                       | 536.4                | 0.60                | 0.18                 | 2.00                        |  |
| 638.00                                                                                                                                                                                                                                                                                                                                                                                       | 637.5                | 0.50                | 0.18                 | 2.00                        |  |
| 441.29                                                                                                                                                                                                                                                                                                                                                                                       | 440.7                | 0.59                | 0.18                 | 2.00                        |  |
| 479.88                                                                                                                                                                                                                                                                                                                                                                                       | 479.4                | 0.48                | 0.18                 | 2.00                        |  |
| 513.75                                                                                                                                                                                                                                                                                                                                                                                       | 513.3                | 0.45                | 0.18                 | 2.00                        |  |
| 528.59                                                                                                                                                                                                                                                                                                                                                                                       | 528.2                | 0.39                | 0.18                 | 2.00                        |  |
| 575.10                                                                                                                                                                                                                                                                                                                                                                                       | 574.5                | 0.60                | 0.18                 | 2.00                        |  |
| 585.56                                                                                                                                                                                                                                                                                                                                                                                       | 585.4                | 0.16                | 0.20                 | 2.00                        |  |
| 684.70                                                                                                                                                                                                                                                                                                                                                                                       | 684.1                | 0.60                | 0.18                 | 2.00                        |  |
| 740.51                                                                                                                                                                                                                                                                                                                                                                                       | 740.2                | 0.31                | 0.20                 | 2.00                        |  |
| 747.61                                                                                                                                                                                                                                                                                                                                                                                       | 747.0                | 0.61                | 0.18                 | 2.00                        |  |
| 807.04                                                                                                                                                                                                                                                                                                                                                                                       | 806.4                | 0.64                | 0.18                 | 2.00                        |  |
| 879.68                                                                                                                                                                                                                                                                                                                                                                                       | 879.1                | 0.58                | 0.18                 | 2.00                        |  |
| <div> <div>Remark : - UUC = Unit Under Calibration</div> <div>- N/A = Not Available</div> <div>- The result expanded uncertainty of measurement U is stated as the standard uncertainty of measurement multiplied by the coverage factor <i>k</i>, which for a normal distribution corresponds to a coverage probability of approximately 95%</div> <div>- End of Certificate -</div> </div> |                      |                     |                      |                             |  |

| <div>  <div> DQE Services Co.,Ltd.<br/> 32 Soi Ladprao-Wanghin 55, Ladprao-Wanghin Rd., Ladprao, Bangkok 10230<br/> Phone : +66 (0)2 538 2054, Email : dqeservicesinfo@gmail.com </div> </div> |                      |                      |                     |                      |                             |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|----------------------|---------------------|----------------------|-----------------------------|
| <div> <div> <div>REPORT OF CALIBRATION</div> <div> Certificate No. : SP25-024 </div> <div> Photometric Accuracy : </div> </div> <div> <div>Page 4 of 5</div> </div> </div>                                                                                                     |                      |                      |                     |                      |                             |
| Wavelength<br>(nm.)                                                                                                                                                                                                                                                            | CRMs Values<br>(Abs) | UUC Reading<br>(Abs) | Correction<br>(Abs) | Uncertainty<br>(Abs) | Coverage factor<br><i>k</i> |
| 235                                                                                                                                                                                                                                                                            | 0.0000               | 0.000                | 0.0000              | 0.0050               | 2.00                        |
|                                                                                                                                                                                                                                                                                | 0.7469               | 0.747                | -0.0001             | 0.0057               | 2.00                        |
| 257                                                                                                                                                                                                                                                                            | 0.0000               | 0.000                | 0.0000              | 0.0050               | 2.00                        |
|                                                                                                                                                                                                                                                                                | 0.8674               | 0.864                | 0.0034              | 0.0059               | 2.00                        |
| 313                                                                                                                                                                                                                                                                            | 0.0000               | 0.000                | 0.0000              | 0.0050               | 2.00                        |
|                                                                                                                                                                                                                                                                                | 0.2919               | 0.293                | -0.0011             | 0.0051               | 2.00                        |
| 350                                                                                                                                                                                                                                                                            | 0.0000               | 0.000                | 0.0000              | 0.0050               | 2.00                        |
|                                                                                                                                                                                                                                                                                | 0.6430               | 0.639                | 0.0040              | 0.0055               | 2.00                        |

**Condition of this calibration result:**

Reference Standard Instruments : This certification is traceable to the international unit of unit maintained through:

| Instruments                  | Model    | Serial No. | Certificate No. | Traceable                                          |
|------------------------------|----------|------------|-----------------|----------------------------------------------------|
| Data Acquisition Switch Unit | 34970A   | MY44065265 | WK2407-141-1    | WK Electric Co., Ltd.                              |
| Digital Thermo-Hygrometer    | HT-771SD | AL07155    | 25H171          | Technology Promotion Association (Thailand-Japan). |

**Calibration Result:**

Measurement Temperature Source Accuracy for COD Reactor.

| Capacity<br>(Vial) | Nominal Value<br>(°C) | Average Value<br>(°C) | Uncertainty of Measurement<br>(±°C) |
|--------------------|-----------------------|-----------------------|-------------------------------------|
| 25 Vial            | 150.0                 | 150.4                 | 0.47                                |

Unit : °C

|         |         |         |         |         |
|---------|---------|---------|---------|---------|
| (1A)    | (2A)    | (3A)    | (4A)    | (5A)    |
| 150.407 | 150.377 | 150.269 | 150.402 | 150.422 |
| (1B)    | (2B)    | (3B)    | (4B)    | (5B)    |
| 150.426 | 150.394 | 150.644 | 150.690 | 150.542 |
| (1C)    | (2C)    | (3C)    | (4C)    | (5C)    |
| 150.477 | 150.303 | 150.627 | 150.257 | 150.176 |
| (1D)    | (2D)    | (3D)    | (4D)    | (5D)    |
| 150.462 | 150.456 | 150.199 | 150.406 | 150.102 |
| (1E)    | (2E)    | (3E)    | (4E)    | (5E)    |
| 150.185 | 150.513 | 150.235 | 150.460 | 150.442 |

Figure: Shows the location of the temperature source.

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

\*\* End of certificate \*\*

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**CERTIFICATE OF CALIBRATION**

|                         |                                                     |                           |                   |
|-------------------------|-----------------------------------------------------|---------------------------|-------------------|
| Equipment :             | COD Test Tube Heater                                | Serial No. :              | H018500I          |
| Meter Model :           | HI839800-02                                         | Resolution :              | 0.1°C             |
| Tube Heater :           | 25 Vial Capacity                                    | Temperature of Reaction : | 150°C             |
| Temperature Range :     | (-10 to 160)°C                                      | Manufacturer :            | Hanna Instruments |
| Condition As-Received : | Used Product                                        | Made in :                 | Romania           |
| Ambient Temperature :   | (25 ± 2)°C                                          | Reference :               | RE250401          |
| Customer name :         | United Analyst and Engineering Consultant Co., Ltd. | Relative Humidity :       | (50 ± 15) % RH    |

3 Soi Udomsuk 41, Sukhumvit Rd., Bangchak,  
Phrakhanong, Bangkok 10260

Received date : 5 March 2025

Calibrate date : 7 March 2025

Issue date : 7 March 2025

Calibrated Location : Hanna Instruments (Thailand) Ltd.

Calibration Procedure : This calibrator was conducted by using in-house: calibration procedure  
CP-04 by using certified reference standard instruments.

Calibrated by :

Approved by :

Authorized Signatory  
  
HANNA  
Instruments  
(Thailand) Limited

This certificate was certified only for the instrument we calibrated.

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

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approval of the head of Hanna Instrument (Thailand)เอกสารไม่ควบคุม

### Condition of this result of analysis

### Cal Check Standard Cuvettes Specifications :

Product code: HI97722-11 Lot number: SC0391/24

| Standard cuvette | Standard Value<br>(mg/L) | Lot Standard Deviation<br>(mg/L) | Lot number | Best used before |
|------------------|--------------------------|----------------------------------|------------|------------------|
| A, ZERO          | 0                        | 0.001                            | 8366       | April 2026       |
| B, HI97722       | 20                       | 0.207                            | 7872       | April 2026       |

Specifications for validation procedure:

| Standard cuvette | Standard Value<br>(mg/L) | Lot Standard Deviation<br>(mg/L) | Lot number | Best used before |
|------------------|--------------------------|----------------------------------|------------|------------------|
| B, HI97722       | 20 ± 1                   | 19 to 21                         | 7872       | April 2026       |

### Method of Standardization

This quality is standardized using which is calibrated by adaptation of Turbidimetric Method as the following details below :

### Result of analysis :

| Cyanuric Acid Standard (mg/L) | Reading (mg/L) | Error (mg/L) |
|-------------------------------|----------------|--------------|
| 0                             | 0              | 0            |
| 20 ± 1                        | 20             | 0            |

\*\* End of certificate \*\*

Certificate No. : HIT-2513-0437

Page : 1 of 2

### CERTIFICATE OF ANALYSIS

Equipment : Cyanuric Acid Portable Photometer  
Meter Model : HI97722C Serial No. : 905060058111  
Manufacturer : Hanna Instruments  
Made in : Romania  
Condition As-Received : Used Product  
Reference : RE250509  
Customer name : United Analyst and Engineering Consultant Co., Ltd.  
3 Soi Udomsuk 41, Sukhumvit Rd., Bangchak,  
Phrakhamong, Bangkok 10260  
Received date : 20 March 2025  
Calibrate date : 24 March 2025  
Issue date : 24 March 2025  
Ambient Temperature : (25 ± 2) °C  
Relative Humidity : (50 ± 15) % RH  
Calibrated Location : Hanna Instruments (Thailand) Ltd.

Calibrated by :

Approved by :

Authorized Signatory



This certificate was certified only for the instrument we calibrated.

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

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approval of the head of Hanna Instrument (Thailand) Limited **เอกสารไม่ควบคุม**



## 3. Trueness

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

| Element | Standard Value of RM<br>(mg/l) | Reading<br>(mg/l) | Error of Measurement<br>(mg/l) | Error of Measurement<br>(%) | Uncertainty<br>(mg/l) |
|---------|--------------------------------|-------------------|--------------------------------|-----------------------------|-----------------------|
| Cd      | 0.020                          | 0.020             | 0.000                          | 1.23                        | ± 0.005               |
|         | 0.300                          | 0.300             | 0.000                          | 0.11                        | ± 0.005               |
|         | 0.700                          | 0.688             | -0.012                         | 1.67                        | ± 0.008               |

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

| Element | Standard Value of RM<br>(mg/l) | Reading<br>(mg/l) | Error of Measurement<br>(mg/l) | Error of Measurement<br>(%) | Uncertainty<br>(mg/l) |
|---------|--------------------------------|-------------------|--------------------------------|-----------------------------|-----------------------|
| Cr      | 0.1000                         | 0.109             | 0.009                          | 9.39                        | ± 0.009               |
|         | 0.3000                         | 0.306             | 0.006                          | 1.98                        | ± 0.012               |
|         | 0.7000                         | 0.657             | -0.043                         | 6.20                        | ± 0.023               |

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

| Element | Standard Value of RM<br>(mg/l) | Reading<br>(mg/l) | Error of Measurement<br>(mg/l) | Error of Measurement<br>(%) | Uncertainty<br>(mg/l) |
|---------|--------------------------------|-------------------|--------------------------------|-----------------------------|-----------------------|
| Cu      | 0.050                          | 0.050             | 0.000                          | 0.68                        | ± 0.003               |
|         | 0.300                          | 0.292             | -0.008                         | 2.70                        | ± 0.009               |
|         | 0.700                          | 0.684             | -0.016                         | 2.31                        | ± 0.020               |

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Changwat Pathumthani 12120, Thailand  
Tel. (66) 0 2577 9036  
Fax. (66) 0 2577 9009

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

**Office**  
196 Phahonyothin Road, Ladysao, Chatuchak,  
Bangkok 10900, Thailand  
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## 2. Precision

| Element | Conc.<br>(mg/l) | Absorbance |        |        |        |        |        |        |        |        |        | Ave.<br>Abs. | SD     | %RSD |
|---------|-----------------|------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------------|--------|------|
| Cd      | 0.02            | 0.0076     | 0.0066 | 0.0071 | 0.0065 | 0.0075 | 0.0066 | 0.0077 | 0.0065 | 0.0065 | 0.0065 | 0.007        | 0.0005 | 7.39 |
|         | 0.30            | 0.0923     | 0.0921 | 0.0920 | 0.0917 | 0.0919 | 0.0904 | 0.0929 | 0.0910 | 0.0915 | 0.0927 | 0.092        | 0.0008 | 0.82 |
|         | 0.70            | 0.2083     | 0.2082 | 0.2100 | 0.2114 | 0.2102 | 0.2091 | 0.2096 | 0.2093 | 0.2088 | 0.2082 | 0.209        | 0.0010 | 0.49 |
| Cr      | 0.10            | 0.0095     | 0.0104 | 0.0097 | 0.0093 | 0.0095 | 0.0091 | 0.0096 | 0.0095 | 0.0082 | 0.0080 | 0.009        | 0.0007 | 7.63 |
|         | 0.30            | 0.0234     | 0.0243 | 0.0237 | 0.0242 | 0.0226 | 0.0232 | 0.0232 | 0.0233 | 0.0237 | 0.0237 | 0.023        | 0.0008 | 3.61 |
|         | 0.70            | 0.0474     | 0.0490 | 0.0497 | 0.0516 | 0.0487 | 0.0476 | 0.0474 | 0.0484 | 0.0473 | 0.0474 | 0.048        | 0.0014 | 2.85 |
| Cu      | 0.05            | 0.0073     | 0.0072 | 0.0060 | 0.0068 | 0.0067 | 0.0065 | 0.0070 | 0.0066 | 0.0068 | 0.0070 | 0.007        | 0.0004 | 5.53 |
|         | 0.30            | 0.0380     | 0.0385 | 0.0377 | 0.0382 | 0.0394 | 0.0375 | 0.0381 | 0.0392 | 0.0389 | 0.0385 | 0.038        | 0.0006 | 1.62 |
|         | 0.70            | 0.0888     | 0.0895 | 0.0890 | 0.0902 | 0.0897 | 0.0893 | 0.0899 | 0.0890 | 0.0902 | 0.0898 | 0.090        | 0.0005 | 0.56 |
| Fe      | 0.10            | 0.0102     | 0.0103 | 0.0100 | 0.0092 | 0.0109 | 0.0094 | 0.0101 | 0.0098 | 0.0092 | 0.0101 | 0.010        | 0.0005 | 5.39 |
|         | 0.50            | 0.0421     | 0.0421 | 0.0424 | 0.0421 | 0.0425 | 0.0412 | 0.0419 | 0.0425 | 0.0419 | 0.0429 | 0.042        | 0.0005 | 1.09 |
|         | 1.00            | 0.0791     | 0.0782 | 0.0780 | 0.0780 | 0.0776 | 0.0792 | 0.0780 | 0.0782 | 0.0786 | 0.0794 | 0.078        | 0.0006 | 0.78 |
| Pb      | 0.20            | 0.0092     | 0.0087 | 0.0081 | 0.0092 | 0.0090 | 0.0087 | 0.0091 | 0.0082 | 0.0091 | 0.0088 | 0.009        | 0.0004 | 4.49 |
|         | 0.70            | 0.0275     | 0.0290 | 0.0288 | 0.0283 | 0.0272 | 0.0286 | 0.0280 | 0.0285 | 0.0288 | 0.0286 | 0.028        | 0.0006 | 2.09 |
|         | 1.50            | 0.0592     | 0.0580 | 0.0591 | 0.0596 | 0.0577 | 0.0589 | 0.0591 | 0.0584 | 0.0575 | 0.0595 | 0.059        | 0.0008 | 1.28 |
| Mn      | 0.05            | 0.0126     | 0.0130 | 0.0123 | 0.0113 | 0.0115 | 0.0126 | 0.0122 | 0.0123 | 0.0114 | 0.0117 | 0.012        | 0.0006 | 4.81 |
|         | 0.30            | 0.0588     | 0.0582 | 0.0584 | 0.0593 | 0.0582 | 0.0584 | 0.0596 | 0.0602 | 0.0581 | 0.0577 | 0.059        | 0.0008 | 1.33 |
|         | 0.70            | 0.1320     | 0.1318 | 0.1313 | 0.1306 | 0.1324 | 0.1314 | 0.1320 | 0.1308 | 0.1303 | 0.1305 | 0.131        | 0.0007 | 0.56 |
| Ni      | 0.10            | 0.0107     | 0.0110 | 0.0102 | 0.0098 | 0.0101 | 0.0106 | 0.0096 | 0.0108 | 0.0100 | 0.0102 | 0.010        | 0.0005 | 4.44 |
|         | 0.50            | 0.0452     | 0.0454 | 0.0441 | 0.0449 | 0.0452 | 0.0450 | 0.0453 | 0.0452 | 0.0454 | 0.0455 | 0.045        | 0.0004 | 0.89 |
|         | 1.00            | 0.0848     | 0.0875 | 0.0856 | 0.0853 | 0.0866 | 0.0866 | 0.0866 | 0.0865 | 0.0857 | 0.0859 | 0.086        | 0.0008 | 0.92 |
| Zn      | 0.05            | 0.0367     | 0.0370 | 0.0372 | 0.0362 | 0.0369 | 0.0367 | 0.0363 | 0.0367 | 0.0365 | 0.0360 | 0.037        | 0.0004 | 1.02 |
|         | 0.30            | 0.2022     | 0.2009 | 0.2022 | 0.2017 | 0.2022 | 0.2009 | 0.2001 | 0.2016 | 0.2022 | 0.2023 | 0.202        | 0.0008 | 0.38 |
|         | 0.70            | 0.4118     | 0.4123 | 0.4107 | 0.4132 | 0.4142 | 0.4157 | 0.4086 | 0.4098 | 0.4101 | 0.4079 | 0.411        | 0.0025 | 0.60 |

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Request No. 25-68 / 0320

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MTC. ACL. No. 372 / 68

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

| Element | Standard Value of RM<br>(mg/l) | Reading<br>(mg/l) | Error of Measurement<br>(mg/l) | Error of Measurement<br>(%) | Uncertainty<br>(mg/l) |
|---------|--------------------------------|-------------------|--------------------------------|-----------------------------|-----------------------|
| Ni      | 0.100                          | 0.098             | -0.002                         | 1.60                        | ± 0.013               |
|         | 0.500                          | 0.490             | -0.010                         | 2.00                        | ± 0.018               |
|         | 1.000                          | 0.951             | -0.049                         | 4.90                        | ± 0.032               |

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

| Element | Standard Value of RM<br>(mg/l) | Reading<br>(mg/l) | Error of Measurement<br>(mg/l) | Error of Measurement<br>(%) | Uncertainty<br>(mg/l) |
|---------|--------------------------------|-------------------|--------------------------------|-----------------------------|-----------------------|
| Zn      | 0.050                          | 0.048             | -0.002                         | 3.37                        | ± 0.013               |
|         | 0.300                          | 0.325             | 0.025                          | 8.32                        | ± 0.013               |
|         | 0.700                          | 0.677             | -0.023                         | 3.33                        | ± 0.019               |

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

which gives a level of confidence of approximately 95%

Calibrated by .....

Approved by .....

Director of Analytical Chemistry Laboratory

Issued Date : 7 March 2025

INDUSTRIAL METROLOGY AND TESTING SERVICE CENTRE

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Bangkok 10900, Thailand  
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น.22/16



Request No. 25-68 / 0320

4 / 5

MTC. ACL. No. 372 / 68

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

| Element | Standard Value of RM<br>(mg/l) | Reading<br>(mg/l) | Error of Measurement<br>(mg/l) | Error of Measurement<br>(%) | Uncertainty<br>(mg/l) |
|---------|--------------------------------|-------------------|--------------------------------|-----------------------------|-----------------------|
| Fe      | 0.100                          | 0.107             | 0.007                          | 7.06                        | ± 0.014               |
|         | 0.500                          | 0.522             | 0.022                          | 4.49                        | ± 0.016               |
|         | 1.000                          | 0.990             | -0.010                         | 1.02                        | ± 0.029               |

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

| Element | Standard Value of RM<br>(mg/l) | Reading<br>(mg/l) | Error of Measurement<br>(mg/l) | Error of Measurement<br>(%) | Uncertainty<br>(mg/l) |
|---------|--------------------------------|-------------------|--------------------------------|-----------------------------|-----------------------|
| Pb      | 0.200                          | 0.200             | 0.000                          | 0.15                        | ± 0.014               |
|         | 0.700                          | 0.701             | 0.001                          | 0.10                        | ± 0.030               |
|         | 1.500                          | 1.480             | -0.020                         | 1.32                        | ± 0.061               |

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

| Element | Standard Value of RM<br>(mg/l) | Reading<br>(mg/l) | Error of Measurement<br>(mg/l) | Error of Measurement<br>(%) | Uncertainty<br>(mg/l) |
|---------|--------------------------------|-------------------|--------------------------------|-----------------------------|-----------------------|
| Mn      | 0.050                          | 0.051             | 0.001                          | 2.41                        | ± 0.005               |
|         | 0.300                          | 0.291             | -0.009                         | 2.92                        | ± 0.007               |
|         | 0.700                          | 0.665             | -0.035                         | 4.95                        | ± 0.014               |

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PinAAcle 900F Preventive Maintenance (PM)

|                                       |                                                     |                                    |             |  |
|---------------------------------------|-----------------------------------------------------|------------------------------------|-------------|--|
| Company Name:                         | United Analyst and Engineering Consultant Co., LTD. |                                    |             |  |
| Address<br>(Instrument Location):     | 41 Sukumvit Rd., Phra Khanong, Bangkok 10260        |                                    |             |  |
| Serial Number:                        | PFBS20031902                                        | PM Number:                         | 1 of 2      |  |
| Customer Name<br>(if applicable):     | K. Yaida                                            | Telephone Number:                  | 095-5580049 |  |
| Customer Support<br>Engineer Name:    | K. Chayanan                                         | Service Order Number:              | WO-03126047 |  |
| Date PM Performed:<br>(DD-MMM-YYYY)   | 29-Apr-2025                                         | Next PM Due Date:<br>(DD-MMM-YYYY) | 29-Oct-2025 |  |
| Standard Labor Hours to Complete PM : |                                                     |                                    | 5 hours     |  |

| Part Number    | Release | Publication Date | <br>PerkinElmer® |
|----------------|---------|------------------|-----------------------------------------------------------------------------------------------------|
| 09370145 Rev.9 | A       | January 2018     |                                                                                                     |

Scope

The purpose of this PM is to ensure the continued functionality of the PinAAcle 900F by inspecting and replacing any worn or damaged parts. This service should only be performed by a trained representative of PerkinElmer.

The customer should save their method before the PM begins.

General Instructions:

The customer must provide the engineer operational data to demonstrate recent instrument performance prior to starting the PM.

Always check with the customer before making any changes that may affect the customer's analysis or calibration, including a current back-up of system software and/or data files.

The completed document should be signed by an authorized PerkinElmer and customer representative and left with the customer.

Update the PM sticker and instrument logbook as required.

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# PinAAcle 900F Preventive Maintenance Report

Company Name: UAE Consultant Co., LTD.

Instrument Location: 41 Sukumvit Rd.,

Phra Khanong, Bangkok 10260

Instrument Serial No.: PFBS20031902

Date: 29-Apr-2025

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| Additional Tools Required for PM |                             |          |               |
|----------------------------------|-----------------------------|----------|---------------|
| Part Number<br>(if applicable)   | Description                 | Quantity | Serial #      |
| N1013000                         | 0.2A Neutral density filter | 1        | 101N0089015   |
| N1013002                         | 1.0A Neutral density filter | 1        | 101N0089015   |
| 03030997                         | System 2 EDL Driver         | 1        | 03030997      |
| N3050605                         | As System 2 EDL             | 1        | 16148         |
| N3050121                         | Cu Lumina HCL               | 1        | 060419-030180 |
| N3050109                         | Ba Lumina HCL               | 1        | 061219-020041 |
| N3050139                         | K Lumina HCL                | 1        | 030819-010130 |
| N3050152                         | Ni Lumina HCL               | 1        | 052719-020020 |

| Component List             |              |                       |  |
|----------------------------|--------------|-----------------------|--|
| Component / Specific Model | Serial #     | Configuration Notes   |  |
| PinAAcLe900F               | PFBS20031902 | Syngistix V4.0.1.1935 |  |
| F/AS100                    | 100S24040501 |                       |  |
|                            |              |                       |  |

| Parts Lists                 |                                                                     |          |
|-----------------------------|---------------------------------------------------------------------|----------|
| Parts Included with the PM  |                                                                     |          |
| Part Number (if applicable) | Description                                                         | Quantity |
| B0501696                    | Fan Filters                                                         | 2        |
| N3160156                    | O-Ring Kits for Sampling Introduction ( Stainless Steels Nebulizer) | N/A      |
| N3160157                    | O-Ring Kits for Sampling Introduction ( Plastic Nebulizer)          | 1        |
| N9301714                    | Replacement Acetylene Filter Cartridge                              | 1        |
| TH001022                    | Replacement Air Filter Cartridge                                    | 1        |

| Additional Reagents and Standards Required for PM |                           |         |                                     |
|---------------------------------------------------|---------------------------|---------|-------------------------------------|
| Part Number (if applicable)                       | Description               | Quality | Batch/Lot #<br>Expired Date (MM/YY) |
| N9300183                                          | 1000 mg/L Copper Standard | AR      | 27-39CUY1<br>Nov 2025               |

| Additional Reagents and Standards Required for PM (Customer Support Solution) |                       |          |                                        |
|-------------------------------------------------------------------------------|-----------------------|----------|----------------------------------------|
| Part Number (if applicable)                                                   | Description           | Quantity | Batch/Lot #<br>Expiration Date (MM/YY) |
| N/A                                                                           | DI Water              | 250 mL   | AR<br>AR                               |
| N/A                                                                           | 0.5% HNO <sub>3</sub> | 250 mL   | AR<br>AR                               |

7. Flame Interlock Check:

Description: Check to ensure that all safety interlocks are closed.

| Parameter                                     | Specification                                                                | Test Results | Pass/Fail |
|-----------------------------------------------|------------------------------------------------------------------------------|--------------|-----------|
| Flame Sensor                                  | Air/C <sub>2</sub> H <sub>2</sub> Flame correctly shuts down                 | Active       | Passed    |
| Drain Sensor                                  | Air/C <sub>2</sub> H <sub>2</sub> Flame correctly shuts down                 | Active       | Passed    |
| Nebulizer Sensor                              | Air/C <sub>2</sub> H <sub>2</sub> Flame correctly shuts down                 | Active       | Passed    |
| C <sub>2</sub> H <sub>2</sub> Pressure Sensor | Air/C <sub>2</sub> H <sub>2</sub> Flame correctly shuts down                 | Active       | Passed    |
| Air Pressure Sensor                           | Air/C <sub>2</sub> H <sub>2</sub> Flame correctly shuts down                 | Active       | Passed    |
| Burner Head Sensor                            | Choosing Nitrous Oxide as the oxidant should trigger an interlock shuts down | Active       | Passed    |

8. After PM Performance tests:

8.1 Detector Linearity with Barium

Description: Ensures that the detector is linear in the Visible Range.

| Parameter       | Specification   | Certificate Value at 553.6 nm (Abs.) | Test Results | Pass/Fail |
|-----------------|-----------------|--------------------------------------|--------------|-----------|
| 1.0 A ND Filter | ± 5% from Cert. | 0.9668                               | 0.9878       | Passed    |
| 0.2 A ND Filter | ± 5% from Cert. | 0.1953                               | 0.1876       | Passed    |

8.2 Baseline Noise at 1.0 Absorbance with Barium

Description: Ensures that a high absorbance will not produce excessive noise.

| Parameter          | Specification | Results | Pass/Fail |
|--------------------|---------------|---------|-----------|
| Standard Deviation | ≤ 0.010       | 0.0005  | Passed    |

8.3 AA Baseline Noise with Copper

Description: Check baseline noise.

| Parameter          | Specification | Results | Pass/Fail |
|--------------------|---------------|---------|-----------|
| Standard Deviation | ≤ 0.001       | 0.0001  | Passed    |

Procedure Checklist

Use (✓) to check off those steps in the checklist that have been completed.

1. General:

- ✓ Review the instrument performance with the customer and document any recent problems.
- ✓ Inspect the customer log book and make any appropriate PM entries.
- ✓ Perform general inspection of system for cleanliness.

2. PC Instrument Software:

- ✓ Instrument Software user files/databases archived, packed, and/or deleted as needed.

3. Mechanical:

- ✓ Inspect and clean all fans and filters. Replace filters if necessary
- ✓ Inspect all gas lines for leaks and/or wear. Replace if needed.
- ✓ Clean exterior of the instrument.
- ✓ Inspect the burner head, burner chamber, and nebulizer. Clean if needed as stated in the Hardware Guide.
- ✓ Check burner head dimensions with the feeler gauge as stated in the Hardware Guide in the Maintenance chapter section on cleaning the burner head and checking sloth width. Replace if out of specification
- ✓ Check the condition of the end cap, burner head, and nebulizer O-rings. Replace if necessary.
- ✓ Check the drain system for signs of wear. Replace worn or damaged parts.
- ✓ Visually check for proper flame conditions when igniting the Air-C<sub>2</sub>H<sub>2</sub> and N<sub>2</sub>O-C<sub>2</sub>H<sub>2</sub> flames (if applicable).

4. Electrical:

- ✓ Inspect PC boards. Clean if necessary.
- ✓ Carefully check all internal and external cable connections.
- ✓ Check instrument firmware revisions upgrade to current levels (if necessary)
- ✓ Run Diagnostics Test within the Advanced function of the Spectrometer page. Check the results in the service log folder in the Spectrometer BM Log Viewer.

5. Optics:

- ✓ Inspect and clean the sample compartment windows, if needed.
- ✓ Inspect optics. Clean or replace if necessary,

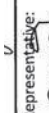
6. Gasses:

- ✓ Verify that the Gasses supplied to the instrument are within the pressure and purity specifications found in the PinAAcle 900 Series Pre-Installation Checklist SDB.
- ✓ Verify that the acetylene filter and air filter element is dry. Replace if necessary.

Additional Comments

|                                      |
|--------------------------------------|
| Additional Comments Regarding the PM |
|                                      |

Review

|                                                                                                                           |                                   |
|---------------------------------------------------------------------------------------------------------------------------|-----------------------------------|
| The preventive maintenance checks and if applicable performance tests for PinAAcle 900F have been completed.              |                                   |
| This PinAAcle 900F Passes <input checked="" type="checkbox"/> Fails <input type="checkbox"/> the preventive maintenance.  |                                   |
| Review of Preventive Maintenance:                                                                                         |                                   |
| Authorized PerkinElmer Representative: /                                                                                  | Date: 29 Apr 2025<br>(DD-MM-YYYY) |
| Authorized Customer Representative:  | Date: 29 Apr 2025<br>(DD-MM-YYYY) |

8.4 D<sub>2</sub> Background Compensation with Copper

Description: Verifies the instruments ability to compensate for Background absorption.

| Parameter          | Specification | Results | Pass/Fail |
|--------------------|---------------|---------|-----------|
| Standard Deviation | ≤ 0.010       | 0.009   | Passed    |

8.5 AA-BG Baseline Noise with Copper

Description: Ensures that background correction does not produce excessive noise.

| Parameter          | Specification | Results | Pass/Fail |
|--------------------|---------------|---------|-----------|
| Standard Deviation | ≤ 0.005       | 0.0001  | Passed    |

8.6 AA-BG Baseline Noise with Arsenic

Description: Ensures that background correction does not produce excessive noise at a low wavelength.

| Parameter          | Specification | Results | Pass/Fail |
|--------------------|---------------|---------|-----------|
| Standard Deviation | ≤ 0.005       | 0.0004  | Passed    |

8.7 Flame Sensitivity

Description: Instrument Sensitivity checked against Copper standard.

| Standard Copper Sensitivity               | Specification | Results (Abs.) | Pass/Fail      |
|-------------------------------------------|---------------|----------------|----------------|
| 5 mg/L Sensitivity SS Neb (if applicable) | > 0.250 Abs.  | N/A            | Not Applicable |
| 2 mg/L Sensitivity HS Neb (if applicable) | > 0.250 Abs.  | N/A            | Passed         |

10. Review:

- ☒ Review with the customer PM work performed.
- ☒ Review with the customer routine maintenance procedures.
- ☒ Discuss recommended customer supplied materials to have on hand.
- ☒ Attach PM sticker.

Customer Acknowledgment of receipt of the above repair / replacement.  
Special Terms and Conditions: This is not an invoice.  
Taxes will be applied to your invoice if applicable.



PerkinElmer Scientific (Thailand) Co., Ltd.  
290 Soi Soonyalai 4  
Khwang Bangkapi, Khet Huay Kwang  
Bangkok 10310  
Thailand  
Tel: 66 2719 6420 : Fax: +66 2 319 7900  
http://www.perkinelmer.com

## Service Report

|                             |                                                       |                 |                     |              |            |                      |                                 |                |               |               |              |
|-----------------------------|-------------------------------------------------------|-----------------|---------------------|--------------|------------|----------------------|---------------------------------|----------------|---------------|---------------|--------------|
| Work Order Number           | WO-03126047                                           | Activity Code   | Planned Maintenance | Billing Type | Contract   | Requested Start Date | 10/01/2568 11:08 TL             | Model          | AAN200051     | Serial Number | PFBS20031902 |
| Service Representative Name | Kanan, Chayanon                                       | Contract Number | SC-0035684109       | Expiry Date  | 31/10/2025 | Equipment ID         | N/A                             | System ID      | N/A           |               |              |
| Customer Contact            | K. ฤทธิฐานธรณ์ (คุณหนู)                               | Phone Number    | 095-5580049         | Fax Number   | N/A        | Email                | nichakorn.praemai1996@gmail.com | Purchase Order | HPO-250100002 |               |              |
| Equipment Location          | บริษัท ปูนซิเมนต์ไทย จำกัด (มหาชน) เลขที่ 51 10260 TH |                 |                     |              |            |                      |                                 |                |               |               |              |
| Bill To Name                | บริษัท ปูนซิเมนต์ไทย จำกัด (มหาชน) เลขที่ 51 10260 TH |                 |                     |              |            |                      |                                 |                |               |               |              |

|                  |                                        |          |            |
|------------------|----------------------------------------|----------|------------|
| Work Description | PM 2/2 (Auriferous)                    |          |            |
|                  | - Cleaning Cell, Chamber, Filter       |          |            |
|                  | - Wavelength Calibrate : Pass          |          |            |
|                  | - Wavelength Scan As,Cu,Ba,K,Ni : Pass |          |            |
|                  | - Align cell with Hg : OK              |          |            |
| Start Date       | 29/04/2025                             | End Date | 09/05/2025 |
| Work Description |                                        |          |            |

|          |                 |                                  |               |                       |                       |
|----------|-----------------|----------------------------------|---------------|-----------------------|-----------------------|
| Quantity | Calibrated Tool | Description                      | Serial Number | Last Calibration Date | Next Calibration Date |
|          |                 | *** No Calibrated Tools Used *** |               |                       |                       |

|             |                       |      |                   |          |
|-------------|-----------------------|------|-------------------|----------|
| Part Number | Part Description      | Note | Lot/Serial Number | Quantity |
|             | *** No Parts Used *** |      |                   |          |

|             |                          |            |          |
|-------------|--------------------------|------------|----------|
| Part Number | Part Description         | Start Date | Quantity |
| SV000013    | Preventative maintenance | 29/04/2025 | 4        |

|                              |                                         |                                        |                    |                      |
|------------------------------|-----------------------------------------|----------------------------------------|--------------------|----------------------|
| Work Complete                | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/>            | Customer Signature | Technician Signature |
| PM/QC/PIV Left with Customer | Yes <input type="checkbox"/>            | No <input checked="" type="checkbox"/> |                    |                      |

|                    |  |
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Component List

| Component / Specific Model | Serial #     | Firmware Version | Configuration Notes   |
|----------------------------|--------------|------------------|-----------------------|
| FIAS100                    | 100S24040501 | 2.20             | Syngistix V4.0.1.1935 |
|                            |              |                  |                       |
|                            |              |                  |                       |
|                            |              |                  |                       |

Parts Lists

| Parts Included with the PM  |             |          |             |
|-----------------------------|-------------|----------|-------------|
| Part Number (if applicable) | Description | Quantity | Batch/Lot # |
| B050 2706                   | Fan Filter  | 1        | N/A         |
|                             |             |          |             |
|                             |             |          |             |

| Additional Tools Required for PM                  |                    |          |             |
|---------------------------------------------------|--------------------|----------|-------------|
| Part Number (if applicable)                       | Description        | Quantity | Serial #    |
| N/A                                               | Digital Volt Meter | 1        | N/A         |
|                                                   |                    |          |             |
|                                                   |                    |          |             |
| Additional Reagents and Standards Required for PM |                    |          |             |
| Part Number (if applicable)                       | Description        | Quantity | Batch/Lot # |
| N/A                                               | N/A                | N/A      | N/A         |
|                                                   |                    |          |             |
|                                                   |                    |          |             |

| Atomic Absorption/FIAS 100/400 Preventive Maintenance (PM) |                                                     |                                 |             |
|------------------------------------------------------------|-----------------------------------------------------|---------------------------------|-------------|
| Company Name:                                              | United Analyst and Engineering Consultant Co., LTD. |                                 |             |
| Address (Instrument Location):                             | 41 Sukumvit Rd., Phra Khanong, Bangkok 10260        |                                 |             |
| Room Number:                                               | Lab                                                 |                                 |             |
| Asset Number (if applicable):                              | 2 of 2W                                             | Customer System ID:             | K. Yanida   |
| Service Engineer Name:                                     | K. Chayanan                                         | Service Order Number:           | WO-03051971 |
| Date PM Performed: (DD-MMM-YYYY)                           | 29-Apr-2025                                         | Next PM Due Date: (DD-MMM-YYYY) | 29-Oct-2025 |

| Part Number | Release | Publication Date |
|-------------|---------|------------------|
| 09370005    | C       | January 2013     |

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Scope

The purpose of this PM is to ensure the continued functionality of the Atomic Absorption/FIAS 100/400 by inspecting and replacing any worn or damaged parts. This service should only be performed by a trained representative of PerkinElmer. The customer should save their method before the PM begins.

General Instructions:

Always check with the customer before making any changes that may affect the customer's analysis or calibration. The completed document should be signed by an authorized PerkinElmer and customer representative and left with the customer. Update the PM sticker and instrument logbook as required.

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#### 4. Cell, Cell Windows, Transfer Line:

- ☒ Cell checked
- ☒ Cell windows checked
- ☒ Transfer line checked for moisture (if moisture is a problem, the Nafion dryer might be needed)

#### 5. Operational Tests:

- ☒ Run DI water through the carrier/reductant/sample system. Verify smooth flow of liquid throughout without leaks. Replace tubing & fittings if needed.

#### 6. Review:

- ☒ Review with the customer PM work performed.
- ☒ Review with the customer routine maintenance procedures.
- ☒ Discuss recommended customer-supplied materials to have on hand.
- ☒ Attach PM sticker.
- ☒ Update Logbook.

## Procedure Checklist

Use (✓) to check off those steps in the checklist that have been completed.

### 1. General:

- ☒ Review the instrument performance with the customer and document any recent problems.

- ☒ Is the Working Environment Acceptable? If not, document.

- ☐ Visual Damage (if yes, describe)

- ☒ Check incoming AC line voltage for proper levels and grounding.
- ☒ Verify Voltage switch on back of instrument is correct
- ☒ Perform general inspection of system for cleanliness. Clean if needed.
- ☒ Gas supply cylinders secured, lines leak checked and argon or nitrogen supply pressure verified (45 – 58 psi).
- ☒ Inspect the customer log book and make any appropriate PM entries.
- ☒ Fan checked and filter cleaned
- ☒ Heating mantle or Universal Cell Holder checked

### 2. Instrument components

- ☒ Non-return valve checked/repairs/replaced if needed (B019 8111). Clean the valve if there is any liquid in it. Replace the rubber sleeve (B013 5123) if it is worn. Check the flow meter for any signs of fluid in it. Clean the flow meter if needed.
- ☒ Verify condition of pump pressure adjustment levers (B050 7794 - look for cracks or problems with the springs), pump rollers (B300 0251 check for wear), and thumb screws (B050 7796).
- ☒ Check the Multiport valve for proper switching, flow, and insure there are no leaks. Clean valve parts and replace o-rings if needed (large o-ring: B050 1250, small o-ring: B004 5095). Use a squirt bottle & fishing line to try to dislodge clogs.
- ☒ Firmware Version checked. Latest is 2.20.

### 3. Mixing/Separation Assembly & Pump Tubing:

- ☒ Mixing separator assembly checked
- ☒ Filter/membrane checked (B050 8306)
- ☒ Condition of the pump tubing (replace if necessary), correct pump tubing for the solutions being run. Make sure the correct magazines are being used. B050 7791 for 0.13 – 1.80 mm tubing; B050 7792 for 1.60 – 3.18 mm tubing.

Document History

| Revision | Description of Change                                             | Page(s) | Date          |
|----------|-------------------------------------------------------------------|---------|---------------|
| A        | First release                                                     |         | May 2008      |
| B        | Addition of Batch/Lot Number, Expiration Date, and Report Fields. | 2,7     | February 2009 |
| C        | Update to new format                                              | All     | January 2013  |

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Additional Comments

| Additional Comments Regarding the PM |
|--------------------------------------|
|                                      |
|                                      |
|                                      |
|                                      |
|                                      |

Review

The preventive maintenance checks and if applicable performance tests for FIAS 100/400 have been completed.

This FIAS 100/400 Passes ☒ Fails ☐ the preventive maintenance.

Review of Preventive Maintenance:

Authorized PerkinElmer Representative: /

Date: 29 Apr 2025 (DD-MM-YYYY)

Authorized Customer Representative: .

Date: 29 Apr 2025 (DD-MM-YYYY)

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Customer Acknowledgment of receipt of the above repair / replacement.  
Special Terms and Conditions: This is not an invoice.  
Taxes will be applied to your invoice if applicable.



PerkinElmer Scientific (Thailand) Co., Ltd.  
290 Soi Soomvijai 4  
Khwang Bangkapi, Khet Huay Kwang  
Bangkok 10310  
Thailand  
Tel: 66 2719 6420 ; Fax: +66 2 319 7900  
http://www.perkinelmer.com

### Service Report

|                             |                         |                 |                     |                 |          |                      |                         |                |               |               |              |
|-----------------------------|-------------------------|-----------------|---------------------|-----------------|----------|----------------------|-------------------------|----------------|---------------|---------------|--------------|
| Work Order Number           | WO-03051971             | Activity Code   | Planned Maintenance | Billing Type    | Contract | Requested Start Date | 10/03/2568 23:08 น.     | Model          | 80508570      | Serial Number | 100524040501 |
| Service Representative Name | Kanin Chayanon          | Contract Number | SC-0035656000       | Contract Number |          | Expiry Date          | 24/05/2025              | Equipment ID   | N/A           | System ID     | N/A          |
| UDI Number                  | N/A                     |                 |                     |                 |          |                      |                         |                |               |               |              |
| Equipment Location          | N/A                     |                 |                     |                 |          |                      |                         |                |               |               |              |
| Customer Contact            | K. Nuchakorn Uthaisakul | Phone Number    | 095-5880049         | Fax Number      | N/A      | Email                | perpichai.442@gmail.com | Purchase Order | HPO-240400211 |               |              |

|                                                                                     |            |
|-------------------------------------------------------------------------------------|------------|
| Work Description                                                                    |            |
| - PM 2/2 Warranty<br>- Cleaning Port Valve, Manifold, Tuning<br>- Run Hg test, Pass |            |
| Start Date                                                                          | 28/04/2025 |
| End Date                                                                            | 29/04/2025 |

|                                  |                 |             |               |                       |                       |
|----------------------------------|-----------------|-------------|---------------|-----------------------|-----------------------|
| Quantity                         | Calibrated Tool | Description | Serial Number | Last Calibration Date | Next Calibration Date |
| *** No Calibrated Tools Used *** |                 |             |               |                       |                       |

|                       |                  |      |                   |          |
|-----------------------|------------------|------|-------------------|----------|
| Part Number           | Part Description | Note | Lot/Serial Number | Quantity |
| *** No Parts Used *** |                  |      |                   |          |

|             |                          |            |          |
|-------------|--------------------------|------------|----------|
| Part Number | Part Description         | Start Date | Quantity |
| SV000013    | Preventative maintenance | 29/04/2025 | 3        |
| SV000002    | Service Travel           | 29/04/2025 | 1        |

|                            |                                         |                                        |                    |                      |
|----------------------------|-----------------------------------------|----------------------------------------|--------------------|----------------------|
| Work Complete              | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/>            | Customer Signature | Technician Signature |
| PM/COPY Left with Customer | Yes <input type="checkbox"/>            | No <input checked="" type="checkbox"/> |                    |                      |

|                    |
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| Terms & Conditions |
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## Agilent CrossLab Start Up Services

### Agilent 5100 5110 ICP-OES Preventive Maintenance



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

This checklist is used as a guide for completing the preventive maintenance tasks. A signed copy of this checklist is provided for your records.

Revision: A.02, Issued: 21 January 2022  
Document Number: G8014-90075  
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#### Terms & Conditions

Customer Acknowledgment of receipt of the above repair / replacement.  
Special Terms and Conditions: This is not an invoice.  
Taxes will be applied to your invoice if applicable.

9/52568 WO-03176049

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### Important Customer Web Links

- To access **Agilent University**, visit <http://www.agilent.com/crosslab/university/> to learn about training options, which include online, classroom and onsite delivery. A training specialist can work directly with you to help determine your best options.
- To access the **Agilent Resource Center** web page, visit <https://www.agilent.com/en-us/agilentresources>. The following information topics are available:
  - Sample Prep and Containment
  - Chemical Standards
  - Analysis
  - Service and Support
  - Application Workflows
- The **Agilent Community** is an excellent place to get answers, collaborate with others about applications and Agilent products, and find in-depth documents and videos relevant to Agilent technologies. Visit <https://community.agilent.com/welcome>
- Videos about specific preparation requirements for your instrument can be found by searching the **Agilent YouTube** channel at <https://www.youtube.com/user/agilent>
- **Need to place a service call?** Flexible Repair Options | Agilent

### Introduction

#### Customer Information

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

## Instrument Maintenance

### System Information

- ☐ Check this box if an instrument configuration report is attached instead of completing the table.

|                                     |
|-------------------------------------|
| Instrument System Name and ID       |
| Instrument System Site and Location |

5110 VDN ICP-OES  
UAE Consultant

| List System Component Product Numbers | List the Serial Numbers of each Component |
|---------------------------------------|-------------------------------------------|
| 1. G 8015 A                           | MY 18030601                               |
| 2.                                    |                                           |
| 3.                                    |                                           |
| 4.                                    |                                           |
| 5.                                    |                                           |
| 6.                                    |                                           |
| 7.                                    |                                           |
| 8.                                    |                                           |
| 9.                                    |                                           |

| ICP-OES Configuration Table | Circle the type or write in the type if other            |
|-----------------------------|----------------------------------------------------------|
| Nebulizer Type              | SeaSpray   OneNeb   Conikal   Other                      |
| Spray Chamber               | Cyclonic Single Pass   Cyclonic Double Pass   Other      |
| Torch                       | Radiant   Dual View   Other                              |
| Torch Type                  | One Piece   Semi Demountable   Fully Demountable   Other |
| Injector Diameter           | 2.4mm   1.8mm   1.4mm   0.8mm   Other                    |
| Injector Material           | Quartz   Ceramic   Other                                 |

## Service Engineer's Responsibilities

- Contact the customer and ensure that all necessary supplies are available before the preventive maintenance visit.
- Only select those pages that relate to the system or module being serviced.
- Complete empty fields with the relevant information.
- Complete the relevant checkboxes in the checklist using either a "X" or tick mark "✓".
- Check "Service not applicable" check boxes to indicate services/tasks not delivered, as appropriate.
- Complete the Preventive Maintenance services in the most logical order relevant to the individual system service in the order of the tasks listed.
- Complete the Service Review section together with the customer.
- Complete the fields for page numbers at the foot of each selected page
- Add relevant page numbers to selected pages and complete the total number of pages field in the Service Completion section
- Ask the customer to sign the Service Verification section including the customer's and your signature.

## Preventive Maintenance Procedures

### Record Pre-PM instrument performance

- ☒ Run Instrument Performance test.
- ☒ Record results in Instrument Performance Test Results Table – Pre-PM.

### Clean and inspect ICP-OES system

- ☒ Look for any obvious external damage or problems.
- ☒ Inspect water cooling hoses, gas lines and power cord for excessive wear or damage.
- ☒ Perform a general internal inspection of the system for excessive dust accumulation, clean if necessary.
- ☒ Inspect sample introduction components and record any required maintenance in the Service Engineer Comments and notify the customer as the required actions required.
- ☒ Record the instrument operating conditions in the ICP-OES Status Results Table.
- ☒ Replace the polychromator purge filter.
- ☒ Replace the radial pre-optics window
- ☒ Replace the axial pre-optics window for SVDV and VDV instruments.
- ☒ Check exhaust flow for the correct positive extraction at the exhaust duct to insure they meet minimum specifications.
- ☒ Replace air inlet dust filter.
- ☐ Replace high capacity air inlet dust filter element if installed. **116**
- ☒ Remove and clean instrument water inlet filter.

### Agilent Water Recirculator

- ☐ **Service not applicable**
- ☒ Drain cooling fluid and remove any particles from the chiller reservoir
- ☒ Remove, clean and reinstall water inlet metal mesh filter if present.
- ☒ Re fill with Agilent Cool Clear cooling fluid.
- ☒ Clean the cooling system Air filter and the condenser.

## Preparation

- ☒ Discuss any specific issues with the customer before starting.
- ☒ Review the instrument logbook for recorded problems and comments.
- ☒ Save instrument control settings before starting the procedure.
- ☒ Perform a general inspection of the system for cleanliness.
- ☒ Check for proper installation of parts, assemblies, sensors etc.
- ☒ Check system for required installation of components and implementation of Service Notes
- ☒ Check for required firmware/software updates and verify with customers if they would like them installed.
- ☐ For HF application systems, if standard sample introduction system was not installed, ask the customer to install it. **11A**
- ☒ Ask the customer to remove any samples from the ICP-OES sample introduction area, auto sampler or around the ICP-OES.

### ICP-OES adjustment

- ☒ Check position of Zn peak, adjust if required.
- ☒ Check Argon Ratio, adjust to specified value if required.
- ☒ Perform Detector Calibration.
- ☒ Perform Instrument Calibration.

### Record Post-PM instrument performance

- ☒ Run Instrument Performance test.
- ☒ Record results in Instrument Performance Test Results Table - Post PM.
- ☒ For systems using ICP Expert version 7.3 and above, run the following instrument tests
  - ☒ Subsystem Communications Test
  - ☒ Air Flow
  - ☒ Water Flow
  - ☒ Gas Flows
  - ☒ RF Generator
  - ☒ Camera Test
  - ☒ Optics Test
  - ☒ Nebulizer Test
- ☒ Record the result in the Instrument Test Results Table

### SPS 3 Auto Sampler

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

### SPS 4 Auto sampler

- ☒ **Service not applicable**
- ☐ Clean the spill tray, rack location mat, end frames and chassis with a damp soft cloth and diluted mild detergent.
- ☐ Clean the auto sampler cover panels, if cover kit is installed, with domestic window cleaner.
- ☐ Check the X-axis and Z-axis drive belts for cracks, splits, damaged teeth, excessive fraying, color changes or degradation from fumes.
- ☐ Check the X-axis, Theta-axis and Z-axis FFC cables for cracks, incorrect positioning, damaged edges or damaged connectors.
- ☐ Pump Tubing Replacement. Replace peristaltic pump tubing. Replace all tubing that goes from the rinse station to the pump and from the pump to the waste/rinse bottles
- ☐ Test using customer's tray and move the sample probe to the sample vial 1, wash vial and rinse port and ensure that the probe is centered in the vial. If not use calibration wizard and calibrate the position.

### AVS 4, 6, 7 Advanced Valve System

- ☒ **Service not applicable**
- ☐ Replace valve rotor seal
- ☐ Check fittings for signs of leaks
- ☐ Check tubing including autosampler tubing for kinks or excessive wear
- ☐ Check high flow pump for signs of leaks

## Test Results

### Instrument Performance Test Results Table

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

|                    | Pre PM Sensitivity Check |         | Post PM Sensitivity Check |         |
|--------------------|--------------------------|---------|---------------------------|---------|
|                    | Radial                   | Axial * | Radial                    | Axial*  |
| Zn 213.857 nm SRBR | 1783.8                   | 2579.2  | 2230.8                    | 3512.9  |
| Mn 257.610 nm SRBR | 9430.5                   | 19614.9 | 10883.0                   | 17884.4 |
| Al 396.152 nm SBR  | 5.2                      | 8.0     | 7.0                       | 7.4     |
| K 766.491 nm SBR   | 3.0                      | 14.6    | 3.4                       | 8.7     |

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

### Instrument Test Results Table

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

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

## Restore Instrument

- ☐ For HF applications, ask the customer to reinstall their sample introduction system.
- ☒ Leave system in an idle state: on and purging.
- ☒ Guidance: If the PM service is performed prior to a qualification service, then use the qualification procedure as a guide for final instrument set up and checkout.

## Service Review

- ☒ Attach available reports/printouts of all tests to this documentation.
- ☒ Record the Preventive Maintenance service activity in the customer's records/logbook.
- ☒ Record the PM event in the Smart Alerts logbook, if applicable.
- ☒ Update/reset instrument maintenance counters as appropriate.
- ☒ Affix the PM sticker to the system or instrument logbook based on the customer's request.
- ☒ Complete the Service Engineer Comments section if there are additional comments.
- ☒ Review this service, parts replaced, and test results obtained with the customer.
- ☒ If the instrument firmware was updated, record the details of the change in the Service Engineer's Comments box. Systems in a compliant environment may need additional documentation.
- ☒ Complete the Signature Page with both Service Engineer and Customer signatures.

## Consumed PM Parts

| Part Description                                               | Part Number | Product or Model# where used  | Quantity consumed |
|----------------------------------------------------------------|-------------|-------------------------------|-------------------|
| Axial Pre-Optic Window                                         | G8010-68014 | G8010A, G8011A, G8014A/G8015A | 1                 |
| Radial Pre-Optic Window                                        | G8010-68015 | All                           | 1                 |
| Agilent Cool Clear Coolant Fluid                               | 5799-0037   | Agilent Water Recirculator    | 1                 |
| Purge Gas Filter                                               | G8010-60136 | All                           | 1                 |
| Air Inlet filter                                               | G8000-68002 | All                           | 1                 |
| High Capacity Air Filter                                       | G8010-60189 | Optional                      | 1                 |
| Rotor seal for 6.7 port valve for AVS6/7                       | G8494-60002 | G8494A/G8495                  | 1                 |
| Rotor seal for 4 port valve for AVS4                           | G8493-60002 | G8493A                        | 1                 |
| Rinse solution to rinse station 2.5mm id x 1m                  | G8410-80123 | SPS 4                         | 1                 |
| Barb connector 2.5mm-1.5mm ID                                  | G8410-80124 | SPS 4                         | 1                 |
| PVC waste tubing 8mm od x 5mm id, 2m                           | G8410-80122 | SPS 4                         | 1                 |
| <b>Additional Parts may be required from engineer's stock:</b> |             |                               |                   |
| X axis drive belt                                              | 5410047500  | SPS 3                         | 1                 |
| Z axis drive belt                                              | 5410047400  | SPS 3                         | 1                 |
| Peristaltic pump tubing, PVC SolvaFlex 3 bridged,              | 3710049000  | SPS 4                         | 1                 |

Consumed Parts Reference  
(Purchased by customer, not included as part of PM)

☒ Section Not Applicable.

| Part Description | Part Number | Product or Model# where used | Quantity consumed |
|------------------|-------------|------------------------------|-------------------|
|------------------|-------------|------------------------------|-------------------|

## ICP-OES Status Results Table

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

| Measurement                  | Standby Mode   | Plasma On   |
|------------------------------|----------------|-------------|
| Mains Voltage                | 231.288        | VAC 226.380 |
| Mains Current                | 0.083          | A 0.100     |
| Instrument Temperature       | 21.1           | °C 21.6     |
| RF Air Flow (sensor speed)   | 44.0           | Hz 41.1     |
| Plasma Exhaust Temperature   | No measurement | °C 47.1     |
| Water Flow Oscillator        | No measurement | L/min 1.14  |
| Water Flow Detector          | 0.92           | L/min 0.90  |
| Water Inlet Temperature      | 19.5           | °C 18.5     |
| Polychromator Temperature    | 35.4           | °C 35.4     |
| CCD Temperature              | -40.1          | °C -39.9    |
| Thermal Stabilizer           | 35.0           | °C 35.0     |
| Argon Supply Pressure        | 634.43         | kPa 583.77  |
| Purge Gas Supply Pressure*1  | 631.28         | kPa 604.02  |
| Option Gas Supply Pressure*1 | -              | kPa -       |
| Nebulizer Flow               | No measurement | L/min 0.70  |
| Nebulizer Back Pressure      | No measurement | kPa 273.61  |
| Plasma Gas Flow              | No measurement | L/min 1196  |
| Auxiliary Gas Flow           | No measurement | L/min 1.00  |
| RF Power                     | No measurement | W 1200.4    |
| RF Supply Current            | No measurement | A 8.228     |
| RF Supply Voltage            | No measurement | V 194.529   |

\*1 If option installed

Report Summary

Instrument Model

Instrument ID

Instrument Serial Number

Software Version

Firmware Version

Tested By

Test Completed On

Agilent 5100/5110 VDV ICP-OES

G8011A/G8015A

MY18030001

7.3.1.9507

3442

Burin 5nd test final

11/19/2025 2:14:28 PM

Result Summary

Subsystem Communications Test

Air Flow Test

Water Flow Test

Gas Flows Test

RF Generator Test

Camera Test

Optics Test

Advanced Valve System Test

Resolution Test

Sensitivity Test

Precision Test

Subsystem Communications Test

Pass

Skipped

Skipped

Skipped

Skipped

Skipped

Skipped

Skipped

Pass

Pass

Pass

Pass

Agilent 5100, 5110 Preventive Maintenance Checklist



Signature Page

Service Engineer Comments (optional)

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

Service Verification

Service Request Number:

Service Engineer Name:

Service Engineer Signature:

Total number of pages in this document:

6008006610

Woravit T.

Woravit T.

14

Date Service Completed:

Customer Name:

Customer Signature:

3 Nov 2025

Aphorn O.

Aphorn O.

Revision: A 02, Issued: 21 January 2022  
Document Number: G8014-90075  
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เอกสารคู่มือ

| Sensitivity Test   |               | Pass   |         |            |         |
|--------------------|---------------|--------|---------|------------|---------|
| Radial             |               |        |         |            |         |
| Element Wavelength | Specification | Method | Ratio   | Standard   | Blank   |
| As (188.980 nm)    | ≥ 46.0        | SRBR   | 96.4    | 735.7      | 50.5    |
| Se (196.028 nm)    | ≥ 41.0        | SRBR   | 79.6    | 779.2      | 77.7    |
| Zn (213.857 nm)    | ≥ 1421.0      | SRBR   | 2270.3  | 24005.6    | 110.8   |
| Pb (220.353 nm)    | ≥ 46.0        | SRBR   | 129.5   | 1701.5     | 144.5   |
| Mn (257.610 nm)    | ≥ 3518.0      | SRBR   | 9810.6  | 233072.5   | 561.7   |
| Al (396.152 nm)    | ≥ 3.4         | SBR    | 6.5     | 36392.0    | 4836.0  |
| Ba (493.408 nm)    | ≥ 34.0        | SBR    | 93.1    | 1586633.9  | 16860.6 |
| K (766.491 nm)     | ≥ 1.8         | SBR    | 1.9     | 54511.9    | 19124.8 |
| Axial              |               |        |         |            |         |
| Element Wavelength | Specification | Method | Ratio   | Standard   | Blank   |
| As (188.980 nm)    | ≥ 208.0       | SRBR   | 245.0   | 3080.3     | 143.7   |
| Se (196.028 nm)    | ≥ 159.0       | SRBR   | 211.9   | 3471.4     | 233.5   |
| Zn (206.200 nm)    | ≥ 234.0       | SRBR   | 771.1   | 8797.9     | 126.5   |
| Zn (213.857 nm)    | ≥ 1743.0      | SRBR   | 6307.2  | 120003.6   | 359.8   |
| Cd (214.439 nm)    | ≥ 4227.0      | SRBR   | 6012.4  | 96451.0    | 256.0   |
| Pb (220.353 nm)    | ≥ 320.0       | SRBR   | 571.2   | 12760.9    | 463.5   |
| Mn (257.610 nm)    | ≥ 10625.0     | SRBR   | 39386.8 | 1701779.7  | 1862.7  |
| Cr (267.716 nm)    | ≥ 1048.0      | SRBR   | 5192.7  | 206938.5   | 1564.3  |
| Cu (324.754 nm)    | ≥ 19.0        | SBR    | 49.4    | 261983.3   | 5202.7  |
| Al (396.152 nm)    | ≥ 6.0         | SBR    | 20.3    | 318135.9   | 14932.2 |
| Ba (493.408 nm)    | ≥ 60.0        | SBR    | 255.9   | 13403057.9 | 52173.2 |
| K (766.491 nm)     | ≥ 24.0        | SBR    | 38.7    | 1918325.2  | 48283.1 |

| Resolution Test    |               | Pass  |  |
|--------------------|---------------|-------|--|
| Element Wavelength | Specification | Width |  |
| N (174.213 nm)     | ≤ 9.40        | 6.66  |  |
| As (188.980 nm)    | ≤ 8.20        | 6.00  |  |
| C (193.027 nm)     | ≤ 11.50       | 7.94  |  |
| Mo (202.032 nm)    | ≤ 8.20        | 6.15  |  |
| Cr (206.158 nm)    | ≤ 13.40       | 8.80  |  |
| Zn (213.857 nm)    | ≤ 8.70        | 6.60  |  |
| Pb (220.353 nm)    | ≤ 9.50        | 7.07  |  |
| Co (228.615 nm)    | ≤ 17.20       | 10.73 |  |
| Ba (230.424 nm)    | ≤ 9.40        | 6.85  |  |
| Mn (257.610 nm)    | ≤ 13.30       | 9.20  |  |
| Mn (260.568 nm)    | ≤ 20.30       | 13.82 |  |
| Cr (267.716 nm)    | ≤ 11.00       | 7.99  |  |
| Cu (324.754 nm)    | ≤ 25.00       | 17.85 |  |
| Cu (327.395 nm)    | ≤ 14.20       | 11.44 |  |
| Sr (338.071 nm)    | ≤ 33.50       | 24.20 |  |
| Ba (455.403 nm)    | ≤ 44.00       | 33.83 |  |
| Sr (460.783 nm)    | ≤ 36.00       | 18.28 |  |
| Ba (493.408 nm)    | ≤ 36.00       | 24.97 |  |
| Ba (614.171 nm)    | ≤ 42.00       | 29.36 |  |
| Ar (675.283 nm)    | ≤ 74.00       | 57.75 |  |
| K (766.491 nm)     | ≤ 80.00       | 73.92 |  |



DMA-80 DIRECT MERCURY ANALYZER System



SITHIPORN ASSOCIATES CO.,LTD.  
451-451/1 Sirinthorn Road, Bangbunru,Bangplud, Bangkok 10700 Thailand  
Tel. (662) 433-8331, 434-9191 fax: (662) 433-1679,434-9510

Precision Test

Radial

| Element Wavelength | Specification | Measured Value % RSD |
|--------------------|---------------|----------------------|
| As (188.980 nm)    | ≤ 2.60        | 1.32                 |
| Se (196.026 nm)    | ≤ 2.60        | 0.81                 |
| Zn (213.857 nm)    | ≤ 1.50        | 0.25                 |
| Pb (220.353 nm)    | ≤ 2.60        | 0.78                 |
| Mn (257.610 nm)    | ≤ 1.50        | 0.28                 |
| Al (396.152 nm)    | ≤ 1.50        | 0.31                 |
| Ba (493.408 nm)    | ≤ 1.50        | 0.28                 |
| K (766.491 nm)     | ≤ 1.50        | 0.19                 |

Axial

| Element Wavelength | Specification | Measured Value % RSD |
|--------------------|---------------|----------------------|
| As (188.980 nm)    | ≤ 1.50        | 0.61                 |
| Se (196.026 nm)    | ≤ 1.50        | 0.72                 |
| Zn (206.200 nm)    | ≤ 1.50        | 0.37                 |
| Zn (213.857 nm)    | ≤ 1.50        | 0.32                 |
| Cd (214.439 nm)    | ≤ 1.50        | 0.31                 |
| Pb (220.353 nm)    | ≤ 1.50        | 0.37                 |
| Mn (257.610 nm)    | ≤ 1.50        | 0.69                 |
| Cr (267.716 nm)    | ≤ 1.50        | 0.35                 |
| Cu (324.754 nm)    | ≤ 1.50        | 0.49                 |
| Al (396.152 nm)    | ≤ 1.50        | 0.49                 |
| Ba (493.408 nm)    | ≤ 1.50        | 0.73                 |
| K (766.491 nm)     | ≤ 1.50        | 0.31                 |

1. VISUAL INSPECTION

|                  | Good | Damaged | Corroded/Dirty |
|------------------|------|---------|----------------|
| External chassis | ✓    |         |                |
| Inside           | ✓    |         |                |
| Electric parts   | ✓    |         |                |
| Screws           | ✓    |         |                |

2. ELECTRICAL SAFETY TEST

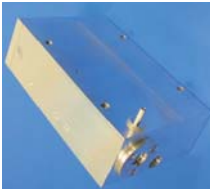
Using a suitable testing device check the below reported parameters and take note of the results.

| Parameter                  | Result                 | OK | Not OK |
|----------------------------|------------------------|----|--------|
| Voltage : 230 VAC ( +10% ) | Actual value : 223 VAC | ✓  |        |
| Ground : ≤ 2               | Actual value: 0.8 VAC  | ✓  |        |

3. PRESSURE CHECK

|             | Oxygen (purity O <sub>2</sub> >99,95%) | Milestone air compressor |
|-------------|----------------------------------------|--------------------------|
| Gas carrier | Purity: -                              | ✓                        |

The pressure at the supply source manometer should be approx. 4.0bar  
The flow rate depends by type of cuvette installed on the DMA-80 unit.

|                |                                                                                      |                                                                                      |                                                                                      |               |              |             |
|----------------|--------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|---------------|--------------|-------------|
|                |  |  |  |               |              |             |
|                | Correct value                                                                        | Actual value                                                                         | Final value                                                                          | Correct value | Actual value | Final value |
| Inlet pressure | 3.1 bar                                                                              | -                                                                                    | -                                                                                    | 3.1 bar       | -            | -           |
| Flow rate      | 10-12 l/h                                                                            | -                                                                                    | -                                                                                    | 8-10 l/h      | -            | -           |

Check all possible leakage points and their conditions:

|                         | Good | Damaged | Corroded |
|-------------------------|------|---------|----------|
| Tubing                  | ✓    |         |          |
| Silicon joints          | ✓    |         |          |
| O-rings                 | ✓    |         |          |
| Cuvette sealing O-rings | ✓    |         |          |
| Gas connections         | ✓    |         |          |
| Valves                  | ✓    |         |          |
| Sample boat carrier     | ✓    |         |          |
| Catalyst flange         | ✓    |         |          |

DMA-80 Direct Mercury Analyzer

SERVICE PROTOCOL REPORT

To be filled in before service visit (1<sup>st</sup> page)

Customer information:

|                   |                                             |
|-------------------|---------------------------------------------|
| Company:          | บ.ยูไนเต็ด แอนาไลติกส์ จก. (สมง.ใหญ่)       |
| Department:       | LAB                                         |
| Person in charge: | ผ. จิว ฒ. ; Q U i PkA Y Q s \ k _ d i w U   |
| Address:          | B dY do141x ๙ ๑๒๑ ๑ ๑๒๒๑ ^>kNN ๙02601 P ; Z |
| Tel.:             | +66 (86) 3191292                            |
| E-mail:           | bhuchonk@uaeconsultant.co.th                |

Technical data:

|                                          |                      |                          |
|------------------------------------------|----------------------|--------------------------|
| Unit Serial Number:                      |                      | 24114043                 |
| Terminal type or USB-G40 Gateway:        | Termianl-660         | SN 24107843              |
| Software, type and revision:             | Easy Control         | Rev. 03-F-SP(2023-09-20) |
| Air Compressor (if present)              | 95100                | SN 12236761              |
| Gas system pump (if present)             | -                    | SN -                     |
| Installation and last maintenance dates: | Inst. on: 31/01/2025 | Maint. on:               |

NOTE: after achievement of the following protocol a filled and signed copy of this report has to be sent to Milestone srl at: [service@milestonesrl.com](mailto:service@milestonesrl.com)

For the best result of the test below we recommended to use the Milestone DMA-80 Service Kit (PN DMA-SKIT).

4. AUTOSAMPLER SYSTEM

|                                  |      |        |             |
|----------------------------------|------|--------|-------------|
| Calibration of autosampler motor | OK   | Not OK | Re-Adjusted |
| Cylinders alignment              | ✓    |        |             |
|                                  | ✓    |        |             |
| Speed of pneumatic cylinders     | Fast | Slow   | Normal      |
|                                  |      |        | ✓           |

Using the maintenance grease, periodically lightly lubricate all exposed steel rods of the horizontal and vertical cylinders.

5. COMPONENTS CHECK

Conditions of the different parts used/installed on DMA unit:

|                     |    |        |          |         |
|---------------------|----|--------|----------|---------|
| Catalyst tube       | OK | Not OK | Replaced | Cleaned |
| Amalgamator         | ✓  |        | ✓        |         |
| Quartz boats        | ✓  |        |          |         |
| Nickel boats        | -  |        |          |         |
| Autosampler plate   | ✓  |        |          |         |
| Gas kit accessories | -  |        |          |         |

6. TEMPERATURES

|                               | Correct value                    |                                                                                     | Actual value | Final value (Pass ) |
|-------------------------------|----------------------------------|-------------------------------------------------------------------------------------|--------------|---------------------|
|                               | If controlled by Infrared sensor | 850°C ± 10°C                                                                        | -            | -                   |
| Drying/ Decomposition furnace | If controlled by thermocouple    | 650°C ± 10°C                                                                        | 650          | Pass                |
| Catalyst furnace              | Type 1                           |  | 515°C ± 5°C  | -                   |
|                               | Type 2,3                         |                                                                                     | 565°C ±10°C  | Pass                |

|                                                                                     |                                  |              |       |      |
|-------------------------------------------------------------------------------------|----------------------------------|--------------|-------|------|
|  | If controlled by Infrared sensor | 170°C ± 10°C | 170°C | Pass |
|                                                                                     | If IR sensor is not present      | 145°C ± 25°C | -     | -    |
| Amalgamator heating temperature                                                     | 850°C ± 10°C                     |              | 850°C | Pass |
| Cuvette                                                                             | 125°C ± 5°C                      |              | 125°C | Pass |

7. SPECTROMETER

The spectrometer can be equipped with a single beam system (ducon lamp) or with a dual beam system (tricon lamp)

|                  | Old cuvette type                                                                    |                                                                                     |                                                                                      | Actual cuvette type                                                                 |                                                                                     |                                                                                      |
|------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
|                  |  |  |  |  |  |  |
|                  | Gain                                                                                |                                                                                     | Offset                                                                               |                                                                                     | Gain                                                                                |                                                                                      |
|                  | Correct value                                                                       | Final value                                                                         | Correct value                                                                        | Actual value                                                                        | Correct value                                                                       | Actual value                                                                         |
| Dualcell system  | 3.6VDC                                                                              | -                                                                                   | 0.015VDC ± 0.005VDC                                                                  | -                                                                                   | 3.9V                                                                                | 0.015VDC ± 0.005VDC                                                                  |
| Tricell system * | -                                                                                   | -                                                                                   | -                                                                                    | -                                                                                   | 3.96VDC                                                                             | 0.015VDC ± 0.005VDC                                                                  |

(\*) The recommended Hg lamp operating signal should be around 3.96VDC (for detector 2) and 3.93VDC (for detector 1).

10. TESTING PROCEDURE

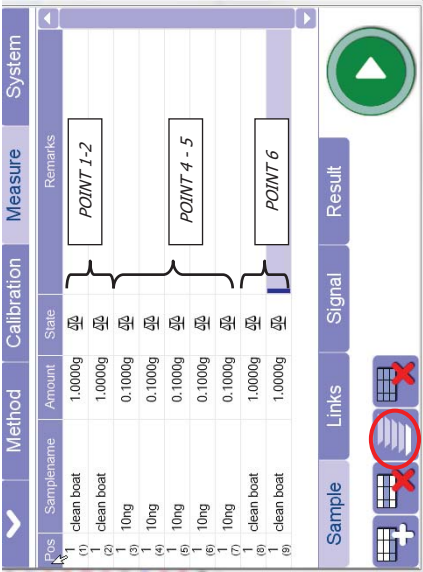
It consists to run some measurements for the evaluation of the analytical performance of the unit, like: absorbance, peaks shape, temperatures, lamp signal and verify the proper working of whole system.

1) Run minimum 2 blanks on the same sample boat (quartz if possible) in manner to clean it

2) Run blanks until absorbance value (Height) decrease under 0.0030 in cell 1

3) Set a fresh and stabilized 100µg/L Hg standard according to the prescriptions reported on the DMA80 User Manual. The quality of the used standard is fundamental for the success of the entire procedure

- 4) Weight approximately 100µg of the fresh 100µg/L – Standard (10ng) and start the analysis as a single measurement mode
- 5) Repeat five times the test
- 6) Run again two blanks measurements



Now, it is possible to evaluate:

- Peaks

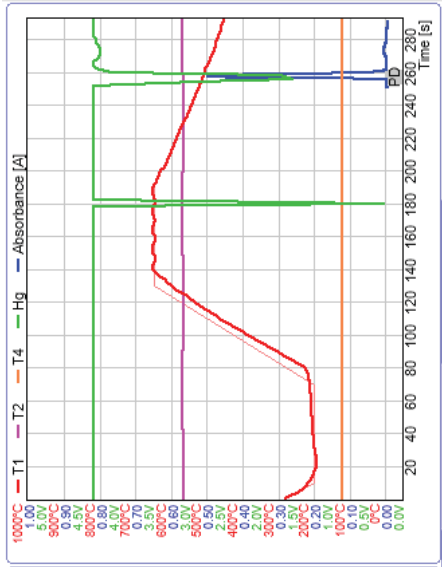
|                                                      | OK | Not OK |
|------------------------------------------------------|----|--------|
| Conditions of the spectrometer system                | ✓  |        |
| Alignment between lamp, cuvette and detector         | ✓  |        |
| Cuvette cleaning (glass windows, sealing O-rings...) | ✓  |        |
| Lamp intensity                                       | ✓  |        |
| Operation of the mechanical shutter (if present)     | ✓  |        |

8. MILESTONE AIR COMPRESSOR

| Maintenance                                     | OK | Date last service |
|-------------------------------------------------|----|-------------------|
| Drain (compressor)                              | ✓  |                   |
| Replacing air filters (air purification module) | ✓  |                   |
| Check sealing connections                       | ✓  |                   |

9. PARTS TO BE REPLACED

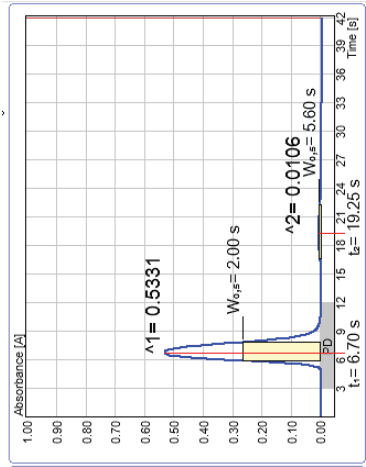
| PN        | DESCRIPTION                                                                                                                                                                                                             | Replaced | Not Replaced |
|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|--------------|
| DMA8133   | Catalyst tube:<br>6 months if the unit runs daily,<br>1 year if the unit is used rarely.<br><i>In case of analyse of sample with high organic concentration the lifetime of the catalyst can be less than 6 months.</i> |          | ✓            |
| DMA8134   | Amalgamator:<br>6 months if the unit runs daily<br>1 year if the unit is used rarely                                                                                                                                    |          | ✓            |
| DMA8195A  | Hg lamp tri-cell (model 2011):<br>5 years                                                                                                                                                                               |          | ✓            |
| DMA8137   | Hg lamp dual-cell:<br>5 years                                                                                                                                                                                           | -        | -            |
| 70200     | Hg trap<br>1 year                                                                                                                                                                                                       |          | ✓            |
| DMA8058/B | Amalgamator coil<br>6 months/1 year or as soon as the heating is not more homogeneous                                                                                                                                   |          | ✓            |
| DMA8142   | Nickel sample boats (set of 40pcs)<br>2 years<br>if strongly used, replace after 1 year                                                                                                                                 | -        | -            |
| DMA8347   | Quartz sample boats (set of 10pcs)<br>2/3 years                                                                                                                                                                         |          | ✓            |
| DMA8335   | Metal sample boat carrier<br>2 years                                                                                                                                                                                    |          | ✓            |
| SL0108    | PU-tube diam. 6/4 mm for internal O <sub>2</sub> /air supply<br>2 years                                                                                                                                                 |          | ✓            |
| SO0376D   | Heating coil for drying/decomposition<br>2 years                                                                                                                                                                        |          | ✓            |



- The Hg lamp signal must be between 3.8 and 4.5V and stable. A few minutes after the start of the analysis the lamp does switch off because of the zero detection but then it instantly returns to the original condition. In case of Tricell configuration two green colour graphics are reported. After the zero shuttering the time necessary to return to full signal is longer on Tricell compare to Ducon lamp.
- During the run the catalyst oven temperature must be stable around to 565°C or 515°C.
- The drying and ashing furnace must be follow the set temperature method.
- During the run the Amalgamator furnace temperature must be stable at the stand by temperature (170°C or 145°C). Then at the release step it must raise up to 850/900°C.
- The Cuvette temperature must be stable at approximately 125°C.
- The Hg absorbance peaks must be correctly detected and reported.

11. FINAL REPORT

|                                                                           |   |
|---------------------------------------------------------------------------|---|
| All screws inserted and tightened                                         | ✓ |
| All tubing sealing connections checked, cleaned or replaced and tightened | ✓ |
| All heating elements are working                                          | ✓ |
| Sensors installed, checked and tightened                                  | ✓ |
| Safety devices (thermo switch) fully checked                              | ✓ |
| All cooling fans are functioning                                          | ✓ |
| Testing procedure successfully passed                                     | ✓ |
| Necessary tools available at customer's site                              | ✓ |
| Last revision of User Manual available at customer's site                 | ✓ |
| Advised customer about care and maintenance instructions                  | ✓ |



- The shape of the peak must be regular.
- The distance between Peak Cell 1 and Peak Cell 2 must be between 11 to 15 seconds.

- Results

| Pos  | Sample name   | Amount  | State | Height Hg [mg] | [ug/kg] | Cal-Factor | Σ      |
|------|---------------|---------|-------|----------------|---------|------------|--------|
| -    | Stability10ng |         | M     |                | 100.290 | 1.0000     |        |
| (7)  | Stability10ng | 0.1000g | ✓     | 0.4931         | 9.9095  | 99.0951    | 1.0000 |
| (8)  | Stability10ng | 0.1000g | ✓     | 0.4965         | 9.9934  | 99.9335    | 1.0000 |
| (9)  | Stability10ng | 0.1000g | ✓     | 0.4991         | 10.059  | 100.597    | 1.0000 |
| (10) | Stability10ng | 0.1000g | ✓     | 0.4976         | 10.022  | 100.221    | 1.0000 |
| (11) | Stability10ng | 0.1000g | ✓     | 0.5031         | 10.160  | 101.602    | 1.0000 |
| (12) | Stability10ng | 0.1000g | ✓     |                |         |            |        |

- The obtained absorbance (height) must be > 0.42 in cell 1 for each 100ppb analysis (0.22 with cuvette installed until December 2005, DMA s/n 05120292.)
- The relative standard deviation (rsd) is < 3 %.
- After two blanks (after 10ng measurements), the absorbance is < 0.0030 in cell 1(\*).

(\*) This condition is valid only in case the unit has: catalyst and amalgamator new, conditioned and never use before, sample boat carrier new and/or perfectly cleaned, catalyst flange new and/or perfectly cleaned, cuvette new and/or perfectly cleaned, tubes, silicon joints and o-rings replaced. Otherwise other blanks (more than 2) might be necessary.

- Temperatures & signal profiles

## Verification Certificate

**Certificate No.:** 2501440-001-01  
**Client name:** UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.  
**Address:** 3 Soi Udomsuk 41, Sukhumvit Road,  
Bangchack, Prakhnong, Bangkok 10260

Page 1 of 4

**Equipment:** Digestion Unit (Heating Block)

**Manufacturer:** FOSS

**Model:** Tecator Digestor 2520

**Serial No.:** 91905060

**ID No.:** UAE.WAS.030/2566

**Order No.:** 2501440

**Operation No.:** 2501440-001

**Date of Receipt:** 27 January 2025

**Date of Calibration:** 27 January 2025

**Calibrated by**

Scientist

**Approved by**

Manager, Division of Calibration Laboratory  
Responsible for the Technical Management Team

**Date of Issue:** 29 January 2025

**The uncertainties are for a confidence probability of approximately 95 %.**  
This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the units of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the National Food Institute.

FCS-009 Revision: 01 Date: 20-04-65

## Verification Report

**Certificate No.:** 2501440-001-01  
**Equipment:** Digestion Unit (Heating Block)  
 Model: Tecator Digester 2520 Serial No.: 91905060  
 Resolution: 1 °C ID No : UAE.WAS.030/2566  
 Manufacturer: FOSS  
 Date of Calibration: 27 January 2025

Page 3 of 4

**Calibration point:** 380 °C

**Calibration result:**

**Table 1 : Reporting of Temperature**

| Block No. | UUC* Setting (°C) | UUC* Reading (°C) | Stability (±°C) | Standard Thermometer (°C) | Uncertainty (±°C) |
|-----------|-------------------|-------------------|-----------------|---------------------------|-------------------|
| 1         | 380               | 380               | 0.22            | 377.84                    | 2.0               |
| 2         | 380               | 380               | 0.19            | 378.68                    | 2.0               |
| 3         | 380               | 380               | 0.13            | 378.70                    | 2.0               |
| 4         | 380               | 380               | 0.12            | 379.82                    | 2.0               |
| 5         | 380               | 380               | 0.20            | 381.01                    | 2.0               |
| 6         | 380               | 380               | 0.16            | 380.48                    | 2.0               |
| 7         | 380               | 380               | 0.16            | 378.22                    | 2.0               |
| 8         | 380               | 380               | 0.19            | 377.99                    | 2.0               |
| 9         | 380               | 380               | 0.09            | 378.48                    | 2.0               |
| 10        | 380               | 380               | 0.15            | 378.17                    | 2.0               |
| 11        | 380               | 380               | 0.18            | 377.64                    | 2.0               |
| 12        | 380               | 380               | 0.11            | 379.27                    | 2.0               |
| 13        | 380               | 380               | 0.13            | 378.14                    | 2.0               |
| 14        | 380               | 380               | 0.25            | 379.11                    | 2.0               |
| 15        | 380               | 380               | 0.15            | 379.83                    | 2.0               |
| 16        | 380               | 380               | 0.18            | 378.05                    | 2.0               |
| 17        | 380               | 380               | 0.31            | 378.44                    | 2.0               |
| 18        | 380               | 380               | 0.18            | 378.29                    | 2.0               |
| 19        | 380               | 380               | 0.17            | 378.41                    | 2.0               |
| 20        | 380               | 380               | 0.13            | 379.24                    | 2.0               |

Note:

- UUC\* = Unit Under Calibration
  - Immersion depth of standard thermometer in tube level high of sand is equal heater plate of UUC.
  - Stability = One-half of the greatest maximum difference of measured temperatures at one sensors, for at least half an hour after reaching steady state.
- The report uncertainty of measurement was based on standard uncertainty multiplied by coverage factor  $k = 2$ , providing a level of confidence of approximately 95 %.

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

## Verification Report

**Certificate No.:** 2501440-001-01  
**Equipment:** Digestion Unit (Heating Block)  
 Model: Tecator Digester 2520 Serial No.: 91905060  
 Resolution: 1 °C ID No : UAE.WAS.030/2566  
 Manufacturer: FOSS  
 Date of Calibration: 27 January 2025

Page 2 of 4

**Location:** Dry Laboratory (312), UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.  
**Environment Condition:** Ambient Temperature ( 29 ± 1 ) °C  
 Relative Humidity ( 58 ± 2 ) %  
 Line Voltage ( 224 ± 1 ) Volt

### Condition of this results of Calibration:

- This instrument was calibrated by insert standard thermocouples type R into its Digestion blocks and Calibration according to NFI Method W-TE-026 based on BS 4309 : 1968
  - The temperature scale used was based on ITS - 90 .
  - All data show below were final values and the initial data may be obtained upon request.
- Reference Standard Instrument :

| Instrument                            | Model         | Serial No.           | Certificate No. | Due Date   | Through                          |
|---------------------------------------|---------------|----------------------|-----------------|------------|----------------------------------|
| Digital Thermometer with Thermocouple | 34970A Type R | MY4045576/MY41194453 | TC24/0063       | 5-Jun-2025 | N.M. Technical Center Laboratory |

- This certificate is traceable to International System of Units (SI Units).
- This certificate was certified only for the instrument we calibrated.
- This result of calibration was found accurate as shown on date and place of calibration only.
- Condition of Calibrated item : Good

UUC\* Description

Time of Record 1 Hour 6 Minute At 380 °C

7. Result of Calibration : ☒ Without adjustment ☐ After adjustment

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

## Customer Service Report

|             |                  |
|-------------|------------------|
| Date:       | 25 February 2025 |
| Job No.:    | 11732            |
| Instrument: | KT9 Distillator  |
| Report No.: | 13851            |
| Customer:   | VAE              |
| Address:    | BANGKOK          |
| Serial:     | 91905393         |

|        |       |                            |  |
|--------|-------|----------------------------|--|
| Start  | 07:00 | Travel To Customer (Hrs)   |  |
| Finish | 09:00 | Chvs                       |  |
|        |       | Labour (Hrs)               |  |
|        |       | 13:00-16:00                |  |
|        |       | Travel From Customer (Hrs) |  |
|        |       | 13:00-16:00                |  |

| Job Type        |                                     | Standard                            |                                     |
|-----------------|-------------------------------------|-------------------------------------|-------------------------------------|
| Application     | Special                             | Installation                        | Quote                               |
| Distributor     | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Digital Service | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Internal        | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Investigate     | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
|                 |                                     | Repair                              | Remote                              |
|                 |                                     | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
|                 |                                     | Health Check Visit                  | <input checked="" type="checkbox"/> |

| PMA Type | Smartcare         |                                     | Smartcare Pro |                                     | Fosscore |                                     |
|----------|-------------------|-------------------------------------|---------------|-------------------------------------|----------|-------------------------------------|
|          | Smartcare Advance | <input checked="" type="checkbox"/> | Fosscore Pro  | <input checked="" type="checkbox"/> | N/A      | <input checked="" type="checkbox"/> |

| Details of Work / Test             |  | OK                                  | Not OK*                             |
|------------------------------------|--|-------------------------------------|-------------------------------------|
| H pm KT9 12M0                      |  | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| - Test before PM                   |  |                                     |                                     |
| - Cleaning KJA, Steamash           |  |                                     |                                     |
| - Flushing Alkali Pump             |  |                                     |                                     |
| - Replac PM bit 12M0               |  |                                     |                                     |
| - Test operation                   |  |                                     |                                     |
| - Dilution 80 = 85 mL Cal to 80 mL |  |                                     |                                     |
| - Distillation 5 min 150-170 mL    |  |                                     |                                     |
| - Alkali 50 = 50 mL                |  |                                     |                                     |
| * Receiver not used                |  |                                     |                                     |
| - All pass                         |  |                                     |                                     |

| Part No. | Batch      | Description                  | Qty |
|----------|------------|------------------------------|-----|
| 60100106 | 09.12.2024 | PM bit Kjeltec 9 Distillator | 1   |

|                                                |                 |
|------------------------------------------------|-----------------|
| I confirm this report is accurate and complete |                 |
| Signed Foss                                    | Signed Customer |
| Name                                           | Name            |

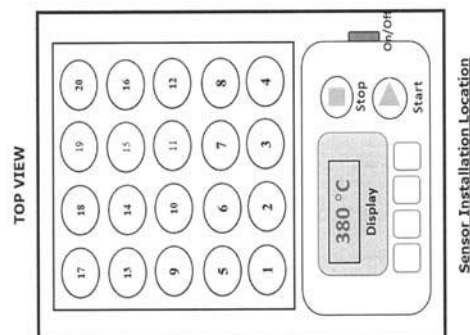
|          |                   |
|----------|-------------------|
| Email:   | Customer Contact: |
| *Remark: |                   |

## Verification Report

Certificate No.: 2501440-001-01  
 Equipment: Digestion Unit (Heating Block)  
 Model: Tecator Digestor ; Serial No.: 91905060  
 Resolution: 1 °C ID No.: UAE.WAS.030/2566  
 Manufacturer: FOSS  
 Date of Calibration: 27 January 2025  
 Calibration point: 380 °C  
 Calibration result: Continued

Page 4 of 4

Figure 1. Location of Reference Standard and Block Diagram of Digestion Unit



FCS-012 Revision: 01 Date: 20-04-65



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 เอกสารแนบ

## Calibration Report

**Certificate No.:** 2502229-001-01  
**Equipment:** CHAMBER (Incubator)  
**Model:** IPP 260 **Serial No.:** V615.0187  
**Resolution:** 0.1 °C **ID No.:** UAE.MTC.003/2559  
**Manufacturer:** MEMMERT  
**Date of Calibration:** 19 March 2025

Page 2 of 3

**Location:** LABORATORY, UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.

**Environment Condition:**  
 Ambient Temperature ( 16.2 ± 1 ) °C  
 Relative Humidity ( 32 ± 4 ) %  
 Line Voltage ( 223 ± 3 ) Volt

### Condition of this results of Calibration:

- This instrument was calibrated by insert 9 standard thermometer into its chamber and calibration according to W-TE-014 Based on TLAS G-20-1/02-08 (E): Guidelines for Calibration and Checks of Temperature Controlled Enclosures.
- The temperature scale used was based on ITS - 90.
- All data show below were final values and the initial data may be obtained upon request.

2. Reference Standard Instrument :

| Instrument                      | Model         | Serial No./ID No.                     | Certificate No. | Due Date   | Through                 |
|---------------------------------|---------------|---------------------------------------|-----------------|------------|-------------------------|
| Digital Thermometer with sensor | 34972A<br>RTD | MY49016851<br>CH#101-109/ RTD#101-109 | TE 670477-01    | 4 May 2025 | NATIONAL FOOD INSTITUTE |

3. This certificate is traceable to International System of Units (SI Units).

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

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

6. Condition of Calibrated Item : Good

UUC Description :

Time of Record 1 Hour 9 Minute At 35.0 °C  
 Fresh air Damper - Open Position -  
 Close X Fan -  
 Not Available -

7. Result of Calibration : ☒ Without adjustment ☐ After adjustment

FCS-012 Revision: 01 Date: 20-04-65



## Calibration Certificate

**Certificate No.:** 2502229-001-01  
**Client name:** UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.  
**Address:** 3 Soi Udomsuk 41, Sukhumvit Road,  
 Bangchack, Prakhonong, Bangkok 10260

Page 1 of 3

**Equipment:** CHAMBER (Incubator)

**Manufacturer:** MEMMERT

**Model:** IPP 260

**Serial No.:** V615.0187

**ID No.:** UAE.MTC.003/2559

**Order No.:** 2502229

**Operation No.:** 2502229-001

**Date of Receipt:** 19 March 2025

**Date of Calibration:** 19 March 2025

**Calibrated by**

Scientist

**Approved by**

Manager, Division of Calibration Laboratory  
 Responsible for the Technical Management Team

**Date of Issue:** 25 March 2025

**The uncertainties are for a confidence probability of approximately 95 %.**

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

FCS-009 Revision: 01 Date: 20-04-65



## Calibration Certificate

**Certificate No.:** 2502229-003-01  
**Client name:** UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.  
**Address:** 3 Soi Udomsuk 41, Sukhumvit Road,  
 Bangchack, Prakhonong, Bangkok 10260

Page 1 of 3

**Equipment:** CHAMBER (Incubator)

**Manufacturer:** MEMMERT

**Model:** IPP260

**Serial No.:** V618.0033

**ID No.:** UAE.MIC.021/2561

**Order No.:** 2502229

**Operation No.:** 2502229-003

**Date of Receipt:** 19 March 2025

**Date of Calibration:** 19 March 2025

**Calibrated by**

Scientist

**Approved by**

Manager, Division of Calibration Laboratory  
 Responsible for the Technical Management Team

**Date of Issue:** 25 March 2025

**The uncertainties are for a confidence probability of approximately 95 %.**

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

F-C5-009 Revision: 01 Date: 20-04-65

## Calibration Report

**Certificate No.:** 2502229-001-01  
**Equipment:** CHAMBER (Incubator)  
**Model:** IPP 260 **Serial No.:** V615.0187  
**Resolution:** 0.1 °C **ID No.:** UAE.MIC.003/2559  
**Manufacturer:** MEMMERT

Page 3 of 3

**Date of Calibration:** 19 March 2025

**Calibration point:** 35.0 °C

**Calibration result:**

| Calibration Condition | Temperature (°C) | Relative Humidity (%) | Line Voltage (Volt) |
|-----------------------|------------------|-----------------------|---------------------|
| MIN                   | 15.5             | 28                    | 220.0               |
| MAX                   | 17.1             | 35                    | 225.0               |

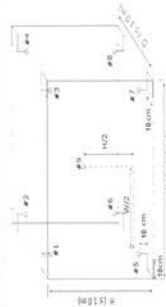


Table 1 : Reporting of Temperature

| Calibration point (°C) | Measured Temperature (°C) @ Sensor No. |       |       |       |       |       |       |       |       | Uncertainty ± (°C) |
|------------------------|----------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|--------------------|
|                        | # 1                                    | # 2   | # 3   | # 4   | # 5   | # 6   | # 7   | # 8   | # 9   |                    |
| 35.0                   | 34.94                                  | 34.95 | 34.91 | 34.93 | 35.15 | 35.01 | 34.98 | 35.05 | 35.12 | 0.29               |

Table 2 : Reporting of Characterization Result

| UUC* Setting (°C) | UUC* Reading (°C) |      | Stability ± (°C) | Uniformity (°C) | Overall Variation (°C) |
|-------------------|-------------------|------|------------------|-----------------|------------------------|
|                   | MIN               | MAX  |                  |                 |                        |
| 35.0              | 35.0              | 35.0 | 0.10             | 0.21            | 0.35                   |

**Note** The quoted uncertainty include " Stability " and " Loading effect (20% of Temp Uniformity) "

UUC\* = Unit Under Calibration

Stability = One-half of the greatest maximum difference of measured temperatures at any one sensors, for at least half an hour after reaching steady state.

Uniformity = The maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time.

Overall Variation = The difference of the maximum and minimum measured temperatures throughout observation time.

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

----- End -----

F-C5-012 Revision: 01 Date: 20-04-65

25 March 2025

## Calibration Report

**Certificate No.:** 2502229-003-01  
**Equipment:** CHAMBER (Incubator)  
 Model: IPP260 Serial No.: V618.0033  
 Resolution: 0.1 °C ID No.: UAE.MIC.021/2561  
 Manufacturer: MEMMERT  
 Date of Calibration: 19 March 2025

Page 3 of 3

**Calibration point:** 22.0 and 25.0 °C

**Calibration result:**

| Calibration Condition | Temperature (°C) | Relative Humidity (%) | Line Voltage (Volt) |
|-----------------------|------------------|-----------------------|---------------------|
| MIN                   | 22.7             | 58                    | 220.0               |
| MAX                   | 23.3             | 60                    | 225.0               |

Table 1 : Reporting of Temperature

| Calibration point (°C) | Measured Temperature (°C) @ Sensor No. |       |       |       |       |       |       |       |       | Uncertainty ± (°C) |
|------------------------|----------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|--------------------|
|                        | # 1                                    | # 2   | # 3   | # 4   | # 5   | # 6   | # 7   | # 8   | # 9   |                    |
| 22.0                   | 22.18                                  | 22.18 | 22.16 | 22.19 | 21.94 | 21.95 | 21.96 | 21.98 | 22.08 | 0.27               |
| 25.0                   | 25.51                                  | 25.32 | 25.29 | 25.34 | 25.05 | 25.02 | 25.04 | 25.09 | 25.15 | 0.27               |

Table 2 : Reporting of Characterization Result

| UUC* Setting (°C) | UUC* Reading (°C) |      |         | Stability ± (°C) | Uniformity (°C) | Overall Variation (°C) |
|-------------------|-------------------|------|---------|------------------|-----------------|------------------------|
|                   | MIN               | MAX  | Average |                  |                 |                        |
| 22.0              | 22.0              | 22.0 | 22.0    | 0.026            | 0.14            | 0.29                   |
| 25.0              | 25.0              | 25.0 | 25.0    | 0.035            | 0.36            | 0.55                   |

Note: The quoted uncertainty include " Stability " and " Loading effect (20% of Temp Uniformity) "

UUC\* = Unit Under Calibration

Stability = One-half of the greatest maximum difference of measured temperatures at any one sensors, for at least half an hour after reaching steady state.

Uniformity = The maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time.

Overall Variation = The difference of the maximum and minimum measured temperatures throughout observation time.

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

----- End -----

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

25 March 2025

## Calibration Report

**Certificate No.:** 2502229-003-01  
**Equipment:** CHAMBER (Incubator)  
 Model: IPP260 Serial No.: V618.0033  
 Resolution: 0.1 °C ID No.: UAE.MIC.021/2561  
 Manufacturer: MEMMERT  
 Date of Calibration: 19 March 2025

Page 2 of 3

**Location:** 302, UNITED ANALYST AND ENGINEERING CONSULTANT CO., LTD.

**Environment Condition:** Ambient Temperature ( 23.0 ± 1 ) °C

Relative Humidity ( 59 ± 1 ) %

Line Voltage ( 223 ± 3 ) Volt

### Condition of this results of Calibration:

- This instrument was calibrated by insert 9 standard thermometer into its chamber and calibration according to W-TE-014 Based on TIAS G-20-1/02-08 (E): Guidelines for Calibration and Checks of Temperature Controlled Enclosures.
- The temperature scale used was based on ITS - 90.
- All data show below were final values and the initial data may be obtained upon request.

2. Reference Standard Instrument :

| Instrument                      | Model  | Serial No./ID No.       | Certificate No. | Due Date    | Through                 |
|---------------------------------|--------|-------------------------|-----------------|-------------|-------------------------|
| Digital Thermometer with sensor | 34972A | MY57003188              | TE 670486-01    | 8 June 2025 | NATIONAL FOOD INSTITUTE |
|                                 | RTD    | CH#301-309/ RTD#301-309 |                 |             |                         |

3. This certificate is traceable to International System of Units (SI Units).

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

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

6. Condition of Calibrated item : Good

UUC Description :

| Time of Record   | 1 | Hour          | 9 | Minute | At | 22.0 and 25.0 °C |
|------------------|---|---------------|---|--------|----|------------------|
| Fresh air Damper | - | Open          | - | -      | -  | -                |
|                  | X | Close         | - | -      | -  | -                |
|                  | - | Not Available | - | -      | -  | -                |

7. Result of Calibration : ☒ Without adjustment ☐ After adjustment

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

25 March 2025



## Calibration Certificate

**Certificate No.:** 2501624-002-01  
**Client name:** UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.  
**Address:** 3 Soi Udomsuk 41, Sukhumvit Road,  
 Bangchack, Prakhnong, Bangkok 10260

Page 1 of 3

**Equipment:** Water Bath

**Manufacturer:** MEMMERT

**Model:** WNE14

**Serial No.:** L416.0612

**ID No.:** UAE.MIC.003/2560

**Order No.:** 2501624

**Operation No.:** 2501624-002

**Date of Receipt:** 10 February 2025

**Date of Calibration:** 10 February 2025

**Calibrated by**

Scientist

WB  
19 February 2025

**Approved by**

Manager, Division of Calibration Laboratory  
 Responsible for the Technical Management Team

**The uncertainties are for a confidence probability of approximately 95 %.**

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

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



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## Calibration Report

**Certificate No.:** 2501624-001-01  
**Equipment:** Water Bath  
**Model:** WNE14  
**Resolution:** 0.1 °C  
**ID No.:** UAE.MIC.002/2560  
**Manufacturer:** MEMMERT

**Date of Calibration:** 10 February 2025

Page 2 of 3

**Location:**

302 Microbiology Laboratory, UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.

**Environment Condition:**

Ambient Temperature ( 26 ± 1 ) °C  
 Relative Humidity ( 59 ± 7 ) %  
 Line Voltage ( 224 ± 1 ) Volt

### Condition of this results of Calibration:

1. This instrument was calibrated by insert 5 standard thermometer into its liquid bath and calibration according to W-TE-011 based on ASTM E715-80 (2022): Standard Specification for Gravity-Convection and Forced-Circulation Water Baths.  
 - The temperature scale used is ITS - 90.  
 - All data show below were final values and the initial data may be obtained upon request.
2. Reference Standard Instrument :

| Instrument                      | Model  | Serial No./ID No.         | Certificate No. | Due Date | Through                 |
|---------------------------------|--------|---------------------------|-----------------|----------|-------------------------|
| Digital Thermometer with sensor | 34972A | MY59002902                | TE 670478-01    | 4-May-25 | NATIONAL FOOD INSTITUTE |
|                                 | RTD    | RTD#301-305 / CHF#301-305 |                 |          |                         |

3. This certificate is traceable to International System of Units (SI Units).

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

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

6. Condition of Calibrated item : Good

UUC Description:

Time of Record 1 Hour 9 Minute At 44.5 °C  
 Without adjustment  
 After adjustment

19 Feb. 2025

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



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# Calibration Report

**Certificate No.:** 2501624-002-01

**Equipment:** Water Bath

Model: WME14      Serial No.: L416.0612

Resolution: 0.1 °C      ID No.: UAE.MTC.003/2560

Manufacturer: MEMMERT

**Date of Calibration:** 10 February 2025

Page 2 of 3

**Location:** 302 Microbiology Laboratory, UNITED ANALYST AND ENGINEERING CONSULTANT CO., LTD.

**Environment Condition:**

| Environment Condition: |               |
|------------------------|---------------|
| Ambient Temperature (  | 24 ± 1) °C    |
| Relative Humidity (    | 59 ± 7) %     |
| Line Voltage (         | 224 ± 1) Volt |

**Condition of this results of Calibration:**

1. This instrument was calibrated by insert 5 standard thermometer into its liquid bath and calibration according to W-TE-011 based on ASTM E715-80 (2022), Standard Specification for Gravity-Convection and Forced-Circulation Water Baths.
  - The temperature scale used is ITS - 90.
  - All data show below were final values and the initial data may be obtained upon request.
- Reference Standard Instrument :

| Instrument                      | Model  | Serial No./ID No.          | Certificate No. | Due Date | Through                 |
|---------------------------------|--------|----------------------------|-----------------|----------|-------------------------|
| Digital Thermometer with sensor | 34972A | MY59002902                 | TE 670478-01    | 4-May-25 | NATIONAL FOOD INSTITUTE |
|                                 | RTD    | RTD# 306-310 / CH# 306-310 |                 |          |                         |

3. This certificate is traceable to International System of Units (SI Units).

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

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

6. Condition of Calibrated item : Good

UUC Description:

| Time of Record | 1 Hour | 9 Minute | At 44.5 °C |
|----------------|--------|----------|------------|
|----------------|--------|----------|------------|

| Without adjustment                    | With adjustment          |
|---------------------------------------|--------------------------|
| <input checked="" type="checkbox"/> X | <input type="checkbox"/> |

|        | Before adjustment | After adjustment |
|--------|-------------------|------------------|
| Mean   | 1.00              | 1.00             |
| SD     | 0.99              | 0.99             |
| Median | 1.00              | 1.00             |
| Q1     | 0.75              | 0.75             |
| Q3     | 1.25              | 1.25             |
| Min    | 0.00              | 0.00             |
| Max    | 3.00              | 3.00             |

19 Feb. 2025

FCS-012 Revision: 01 Date: 20-04-65

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

----- End -----

19 Feb 2025



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© 2008 So 36, Avun Amarin Road, Bang Yi Khan Subdistrict, Bang Phlat District, Bangkok 10710, Thailand



2008 ๒๒๖๒๕๖๒๕๖๒๕๖ 35 ถนนสุขุมวิท แขวงบางนา เขตบางนา กรุงเทพมหานคร 10700  
2008 50 35, Anu Anan Road, Bang Yi Khan Subdistrict, Bang Phai District, Bangkok 10700, Thailand

# Calibration Report

**Certificate No.:** 2501624-002-01

**Equipment:** Water Bath

Model: WME14

Resolution: 0.1 °C

Serial No.: L416.0612

ID No.: UAE.MTC.003/2560

Manufacturer: MEMMERT

**Date of Calibration:** 10 February 2025

Page 3 of 3

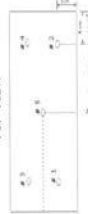
Calibration point: 44.5 °C

**Calibration point:**

| Calibration result:   |                  |                       |                     |
|-----------------------|------------------|-----------------------|---------------------|
| Calibration Condition | Temperature (°C) | Relative Humidity (%) | Line Voltage (Volt) |
| Min                   | 23.0             | 52                    | 223.0               |
| Max                   | 25.0             | 65                    | 225.0               |

**SIDE VIEW**

TOP VIEW



**SIDE VIEW**

**SIDE VIEW**

| Table1 : Reporting of Temperature |                                                                | Sensor Installation Location |       |       |       |                       |
|-----------------------------------|----------------------------------------------------------------|------------------------------|-------|-------|-------|-----------------------|
| Calibration Point<br>(°C)         | Measured Temperature (°C) @ Sensor No.<br>(Sensor No.5 is REF) |                              |       |       |       | Uncertainty<br>± (°C) |
|                                   | # 1                                                            | # 2                          | # 3   | # 4   | # 5   |                       |
| 44.5                              | 44.45                                                          | 44.52                        | 44.47 | 44.48 | 44.45 | 0.20                  |

Sensor Installation Location

Table 2 : Reporting of Characterization Result

| UUC* Setting<br>(°C) | UUC* Reading (°C) |         | Stability<br>± (°C) | Uniformity<br>(°C) | Overall Variation<br>(°C) |
|----------------------|-------------------|---------|---------------------|--------------------|---------------------------|
|                      | MIN               | Average |                     |                    |                           |
|                      | MAX               | Average |                     |                    |                           |
| 44.5                 | 44.4              | 44.5    | 44.5                | 0.077              | 0.23                      |

Note: The quoted uncertainty include "Stability" and "Loading effect (20% of Temp Uniformity)"

$UUC^* = \text{Unit Under Calibration}$

**Stability** = One-half of the greatest maximum difference of measured temperatures at any one sensors, for at least half an hour after reaching steady state.

Uniformity = The maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time.

Overall variation = The difference of the maximum and minimum measured temperatures throughout observation time.

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

## Calibration Report

**Certificate No.:** 2502229-007-01  
**Equipment:** Autoclave  
**Model:** CL-40L      **Serial No.:** 808763  
**Resolution:** 0.1 °C      **ID No.:** UAE.MIC.026/2563  
**Manufacturer:** ALP  
**Date of Calibration:** 19 March 2025

Page 2 of 3

**Location:** LABORATORY, UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.

**Environment Condition:**  
 Ambient Temperature ( 23 ± 1 ) °C  
 Relative Humidity ( 60 ± 5 ) %  
 Line Voltage ( 225 ± 1 ) Volt

### Condition of this results of Calibration:

- This instrument was calibrated by insert 3 standard Data loggers with RTD into its autoclave and calibration according to W-TE-018 based on BS 2646-1:2021. Autoclaves for sterilization in laboratories  
 Part 1: Design, construction, safety and performance - Specification.  
 - The temperature scale used was based on ITS - 90.  
 - All data show below were final values and the initial data may be obtained upon request.
- Reference Standard Instrument :

| Instrument                                 | Model       | Serial No. | Certificate No. | Due Date  | Through                 |
|--------------------------------------------|-------------|------------|-----------------|-----------|-------------------------|
| Digital Thermometer with RTD (Data Logger) | HTemp140-PT | S35646     | TE 670370-01    | 23-Mar-25 | NATIONAL FOOD INSTITUTE |
|                                            | HTemp140-PT | S33753     | TE 670371-01    | 23-Mar-25 | NATIONAL FOOD INSTITUTE |
|                                            | HTemp140-PT | S29973     | TE 670372-01    | 23-Mar-25 | NATIONAL FOOD INSTITUTE |

- 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.
- This standard does not apply to sterilizers or disinfectors used for medical, dental, pharmaceutical.

7. Condition of Calibrated item : Good

UUC Description : Setting program function sterilization : STERILIZE/NORMAL  
 Time of sterilization 15 Minute At 115.0 and 121.0 °C

8. Result of Calibration :  
☒ Without adjustment  
☐ After adjustment

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

## Calibration Certificate

**Certificate No.:** 2502229-007-01  
**Client name:** UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.  
**Address:** 3 Soi Udomsuk 41, Sukhumvit Road,  
 Bangchack, Prakhnong, Bangkok 10260

Page 1 of 3

**Equipment:** Autoclave  
**Manufacturer:** ALP  
**Model:** CL-40L  
**Serial No.:** 808763  
**ID No.:** UAE.MIC.026/2563  
**Order No.:** 2502229  
**Operation No.:** 2502229-007  
**Date of Receipt:** 19 March 2025  
**Date of Calibration:** 19 March 2025

**Calibrated by** **Approved by**

Scientist

Manager, Division of Calibration Laboratory

Responsible for the Technical Management Team

**Date of Issue:** 25 March 2025

**The uncertainties are for a confidence probability of approximately 95 %.**

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

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

## Calibration Certificate

**Certificate No.:** 2503287-001-01  
**Client name:** UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.  
**Address:** 3 Soi Udomsuk 41, Sukhumvit Road,  
Bangchack, Prakhnong, Bangkok 10260

Page 1 of 3

**Equipment:** Autoclave

**Manufacturer:** ALP

**Model:** CL-40L

**Serial No.:** 810010

**ID No.:** UAE.MIC.032/2565

**Order No.:** 2503287

**Operation No.:** 2503287-001

**Date of Receipt:** 5 June 2025

**Date of Calibration:** 5 June 2025

**Calibrated by** : **Approved by**  
Scientist  
Vice President, Department of Laboratory Services  
Responsible for the Technical Management Team

**Date of Issue:** 11 June 2025

**The uncertainties are for a confidence probability of approximately 95 %.**

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

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

## Calibration Report

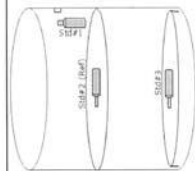
**Certificate No.:** 2502229-007-01  
**Equipment:** Autoclave  
**Model:** CL-40L  
**Serial No.:** 808763  
**Resolution:** 0.1 °C  
**ID No.:** UAE.MIC.026/2563  
**Manufacturer:** ALP  
**Date of Calibration:** 19 March 2025

Page 3 of 3

**Calibration point:** 115.0 and 121.0 °C

**Calibration result:**

| Calibration Condition | Temperature (°C) | Relative Humidity (%) | Line Voltage (Volt) |
|-----------------------|------------------|-----------------------|---------------------|
| Min                   | 22.0             | 55                    | 224                 |
| Max                   | 24.0             | 65                    | 226                 |



Standard at Division

S1021 = Adjacent to the used temperature probe.  
S1022 = In the upper half of the chamber.  
S1023 = In the chamber drain, within 100 mm.

Table 1 : Reporting of Temperature

| Calibration Point (°C) | Measured Temperature (°C) @ Sensor No. |                |          | Uncertainty ± (°C) |
|------------------------|----------------------------------------|----------------|----------|--------------------|
|                        | Std. # 1                               | Std. # 2 (Ref) | Std. # 3 |                    |
| 115.0                  | 115.32                                 | 115.46         | 115.22   | 0.64               |
| 121.0                  | 121.31                                 | 121.53         | 121.31   | 0.64               |

Table 2 : Reporting of Characterization Result

| UUC* Setting (°C) | UUC* Reading |          |              | Stability ± (°C) | Uniformity (°C) | Overall Variation (°C) |
|-------------------|--------------|----------|--------------|------------------|-----------------|------------------------|
|                   | Min (°C)     | Max (°C) | Average (°C) |                  |                 |                        |
| 115.0             | 115.0        | 115.1    | 115.0        | 0.08             | 0.11            | 0.26                   |
| 121.0             | 121.0        | 121.1    | 121.0        | 0.12             | 0.13            | 0.29                   |

Note

The quoted uncertainty include " Stability " and " Loading effect ( 20% of Uniformity ) "

UUC\* = Unit Under Calibration

Stability = One-half of the greatest maximum difference of measured temperatures at any one sensors, for at least half an hour after reaching steady state.

Uniformity = The maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time.

Overall Variation = The difference of the maximum and minimum measured temperatures throughout observation time.

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

----- End -----

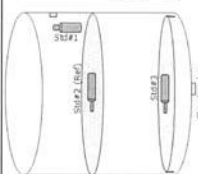
F-CS-012 Revision: 01 Date: 20-04-65

## Calibration Report

**Certificate No.:** 2503287-001-01  
**Equipment:** Autoclave  
**Model:** CL-40L  
**Resolution:** 1 °C  
**ID No.:** UAE.MIC.032/2565  
**Manufacturer:** ALP  
**Date of Calibration:** 5 June 2025

Page 3 of 3

| Calibration point:    |                  |                       |                     |
|-----------------------|------------------|-----------------------|---------------------|
| 115 and 121 °C        |                  |                       |                     |
| Calibration result:   |                  |                       |                     |
| Calibration Condition | Temperature (°C) | Relative Humidity (%) | Line Voltage (Volt) |
| Min                   | 25.8             | 50                    | 225                 |
| Max                   | 26.8             | 59                    | 235                 |



Standard at Revision

SSMF1 = Attached to the lid temperature probe.  
 SSMF2 = In the upper half of the chamber.  
 SSMF3 = In the chamber drain, within 100 mm.

Table 1 : Reporting of Temperature

| Measured Temperature (°C) @ Sensor No. |         |               |                    |
|----------------------------------------|---------|---------------|--------------------|
| (Sensor No.2 is REF)                   |         |               |                    |
| Calibration Point (°C)                 | Std.# 1 | Std.# 2 (Ref) | Std.# 3            |
| 115                                    | 115.46  | 115.43        | 115.42             |
| 121                                    | 121.59  | 121.54        | 121.51             |
|                                        |         |               | Uncertainty ± (°C) |
|                                        |         |               | 0.70               |
|                                        |         |               | 0.70               |

Table 2 : Reporting of Characterization Result

| UUC* Reading      |          |              |                        |
|-------------------|----------|--------------|------------------------|
| UUC* Setting (°C) |          |              |                        |
| Min (°C)          | Max (°C) | Average (°C) | MPa                    |
| 115               | 115      | 115          | 0.08                   |
| 121               | 121      | 121          | 0.12                   |
|                   |          |              | Stability ± (°C)       |
|                   |          |              | 0.24                   |
|                   |          |              | Uniformity (°C)        |
|                   |          |              | 0.17                   |
|                   |          |              | Overall Variation (°C) |
|                   |          |              | 0.50                   |
|                   |          |              | 0.52                   |

### Note

The quoted uncertainty include " Stability " and " Loading effect ( 20% of Uniformity )"

UUC\* = Unit Under Calibration

Stability = One-half of the greatest maximum difference of measured temperatures at any one sensors, for at least half an hour after reaching steady state.

Uniformity = The maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time.

Overall Variation = The difference of the maximum and minimum measured temperatures throughout observation time.

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

----- End -----

F-C5-012 Revision: 01 Date: 20-04-65

11 June 2025

## Calibration Report

**Certificate No.:** 2503287-001-01  
**Equipment:** Autoclave  
**Model:** CL-40L  
**Resolution:** 1 °C  
**ID No.:** UAE.MIC.032/2565  
**Manufacturer:** ALP  
**Date of Calibration:** 5 June 2025

Page 2 of 3

**Location:** Room 301 Media Preparation, UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.

**Environment Condition:** Ambient Temperature ( 26 ± 1 ) °C

Relative Humidity ( 55 ± 5 ) %

Line Voltage ( 230 ± 5 ) Volt

### Condition of this results of Calibration:

- This instrument was calibrated by insert 3 standard Data loggers with RTD into its autoclave and calibration according to W-TE-018 based on BS 2646-1:2021, Autoclaves for sterilization in laboratories  
 Part 1: Design, construction, safety and performance - Specification.  
 - The temperature scale used was based on ITS - 90.  
 - All data show below were final values and the initial data may be obtained upon request.
- Reference Standard Instrument :

| Instrument                                 | Model            | Serial No. | Certificate No. | Due Date  | Through                 |
|--------------------------------------------|------------------|------------|-----------------|-----------|-------------------------|
| Digital Thermometer with RTD (Data Logger) | HITemp140-PT     | T20627     | NC-25-03-18-181 | 11-Mar-26 | MADGETECH, INC.         |
|                                            | OM-CP-HITEMP-140 | R56916     | 2502081-002-01  | 11-Mar-26 | NATIONAL FOOD INSTITUTE |
|                                            | PRTemp140        | R38546     | 2501835-001-01  | 22-Feb-26 | NATIONAL FOOD INSTITUTE |

3. This certificate is traceable to International System of Units (SI Units).

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

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

6. This standard does not apply to sterilizers or disinfectors used for medical, dental, pharmaceutical.

7. Condition of Calibrated item : Good

UUC Description : Setting program function sterilization : STERILIZE/NORMAL

Time of sterilization 20 Minute At 115 and 121 °C

8. Result of Calibration :

|                                     |                    |
|-------------------------------------|--------------------|
| <input checked="" type="checkbox"/> | Without adjustment |
| <input type="checkbox"/>            | After adjustment   |

F-C5-012 Revision: 01 Date: 20-04-65

11 June 2025

## Calibration Report

Certificate No.: 2502227-001-01  
Equipment: Electronic Balance  
Model: PX623  
Serial No.: C236754745  
Capacity: 620

Manufacturer: OHAUS  
Resolution: 0.001  
ID No.: UAE.MIC.055/2565

Date of Calibration: 19 March 2025

Calibration Results: (Continued)

Calibration Range: 0-600 g

Calibration Adjustment: Internal Calibration

3. Departure from Nominal Value:

| Nominal Value<br>( g ) | Standard Value<br>( g ) | Average Reading<br>( g ) | Correction<br>( g ) | Uncertainty<br>( ± g ) | Coverage Factor<br>k |
|------------------------|-------------------------|--------------------------|---------------------|------------------------|----------------------|
| Unload                 | 0.0000                  | 0.000                    | 0.000               | 0.00086                | 2.00                 |
| 1                      | 1.0000                  | 1.000                    | 0.000               | 0.00086                | 2.00                 |
| 5                      | 5.0000                  | 4.999                    | 0.001               | 0.00086                | 2.00                 |
| 10                     | 10.0000                 | 10.000                   | 0.000               | 0.00086                | 2.00                 |
| 20                     | 20.0000                 | 20.000                   | 0.000               | 0.00086                | 2.00                 |
| 50                     | 50.0000                 | 50.000                   | 0.000               | 0.00087                | 2.00                 |
| 100                    | 100.0001                | 100.000                  | 0.000               | 0.00087                | 2.00                 |
| 200                    | 200.0001                | 200.001                  | -0.001              | 0.00090                | 2.00                 |
| 300                    | 300.0002                | 300.001                  | -0.001              | 0.00094                | 2.00                 |
| 400                    | 400.0003                | 399.999                  | 0.001               | 0.0011                 | 2.00                 |
| 500                    | 500.0003                | 499.999                  | 0.001               | 0.0011                 | 2.00                 |
| 600                    | 600.0004                | 600.000                  | 0.000               | 0.0012                 | 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 -----

FCS-012 Revision: 01 Date: 20-04-65



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## Calibration Certificate

Certificate No.: 2502227-001-01  
Client name: UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.  
Address: 3 Soi Udomsuk 41, Sukhumvit Road,  
Bangchack, Prakhnong, Bangkok 10260

Page 1 of 3

Equipment: Electronic Balance

Manufacturer: OHAUS

Model: PX623

Serial No.: C236754745

ID No.: UAE.MIC.055/2565

Order No.: 2502227

Operation No.: 2502227-001

Date of Receipt: 19 March 2025

Date of Calibration: 19 March 2025

Calibrated by

Scientist

Approved by

Manager, Division of Calibration Laboratory

Responsible for the Technical Management Team

Date of Issue: 25 March 2025

The uncertainties are for a confidence probability of approximately 95%

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

FCS-009 Revision: 01 Date: 20-04-65



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



## CERTIFICATE OF CALIBRATION

### FOR

NOMENCLATURE : VIBRATION METER  
MANUFACTURER : VIBROCK  
MODEL / TYPE : V9000  
SERIAL NO. : 2350  
CLID. NO. : 252101272  
JOB CONTROL NO. : 251118136392  
CALIBRATION SERVICE : ☒ IN-LABORATORY ☐ ON-SITE

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

DATE OF RECEIVED : 18 November 2025 DATE OF ISSUED : 21 November 2025

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

Calibrated By :

Calibration Engineer



Approved By :

Authorized Signatory

21 November 2025

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

Certificate No. Q25136392

F3-011-05/12-23

page 1 of 3



@clcalibration



Continuation of Certificate of Calibration Number COF-049-68

Page 2 of 2 Pages

#### MEASUREMENT RESULTS:

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

Table 1: The results of  $Q$  Standard calibration data

| Plate | Flow rate<br>m <sup>3</sup> /min | Pressure<br>[Pa]<br>mmHg | Temperature<br>[T <sub>a</sub> ]<br>°C | Temperature<br>[T <sub>m</sub> ]<br>°C | Ap_meter<br>mmHg | Ap_orifice<br>InH <sub>2</sub> O | γ     | Standard Flow [Q <sub>s</sub> ]<br>m <sup>3</sup> /min |
|-------|----------------------------------|--------------------------|----------------------------------------|----------------------------------------|------------------|----------------------------------|-------|--------------------------------------------------------|
| 1     | 0.702                            | 760.447                  | 24.07                                  | 23.24                                  | 56.905           | 1.727                            | 1.317 | 0.654                                                  |
| 2     | 1.004                            | 760.448                  | 24.17                                  | 23.44                                  | 62.166           | 3.499                            | 1.874 | 0.927                                                  |
| 3     | 1.119                            | 760.542                  | 24.15                                  | 23.53                                  | 43.069           | 4.593                            | 2.147 | 1.062                                                  |
| 4     | 1.170                            | 760.587                  | 24.13                                  | 23.62                                  | 30.735           | 5.222                            | 2.289 | 1.129                                                  |
| 5     | 1.416                            | 760.597                  | 24.23                                  | 23.81                                  | 30.531           | 7.678                            | 2.776 | 1.361                                                  |

Slope (m): 2.04949  
Intercept (b): -0.02534  
Correlation coefficient (r): 0.99991  
Uncertainty (k=2): 0.015 m<sup>3</sup>/min

Table 2: The results of  $Q$  actual calibration data

| Plate | Flow rate<br>m <sup>3</sup> /min | Pressure<br>[Pa]<br>mmHg | Temperature<br>[T <sub>a</sub> ]<br>°C | Temperature<br>[T <sub>m</sub> ]<br>°C | Ap_meter<br>mmHg | Ap_orifice<br>InH <sub>2</sub> O | γ     | Standard Flow [Q <sub>s</sub> ]<br>m <sup>3</sup> /min |
|-------|----------------------------------|--------------------------|----------------------------------------|----------------------------------------|------------------|----------------------------------|-------|--------------------------------------------------------|
| 1     | 0.702                            | 760.447                  | 24.07                                  | 23.24                                  | 56.905           | 1.727                            | 0.822 | 0.651                                                  |
| 2     | 1.004                            | 760.448                  | 24.17                                  | 23.44                                  | 62.166           | 3.499                            | 1.170 | 0.924                                                  |
| 3     | 1.119                            | 760.542                  | 24.15                                  | 23.53                                  | 43.069           | 4.593                            | 1.340 | 1.058                                                  |
| 4     | 1.170                            | 760.587                  | 24.13                                  | 23.62                                  | 30.735           | 5.222                            | 1.429 | 1.125                                                  |
| 5     | 1.416                            | 760.597                  | 24.23                                  | 23.81                                  | 30.531           | 7.678                            | 1.733 | 1.361                                                  |

Slope (m): 1.28368  
Intercept (b): -0.01581  
Correlation coefficient (r): 0.99991  
Uncertainty (k=2): 0.015 m<sup>3</sup>/min

\*\*\*End of Certificate of Calibration\*\*\*



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

**VELOCITY RESULT**

| Test point<br>( mm/s ) | ( frequency ) | Mode | STD Reading<br>( mm/s ) | DUC Reading<br>( mm/s ) | Correction<br>( mm/s ) | Uncertainty<br>± ( % of rdg. ) |
|------------------------|---------------|------|-------------------------|-------------------------|------------------------|--------------------------------|
|                        |               |      |                         |                         |                        |                                |
| 10                     | 160 Hz        | peak | 10.00                   | 9.89                    | +0.11                  | 1.1                            |
| 20                     | 160 Hz        |      | 20.00                   | 19.49                   | +0.51                  | 1.0                            |
| 40                     | 160 Hz        |      | 40.00                   | 39.32                   | +0.68                  | 1.0                            |
| 60                     | 160 Hz        |      | 60.00                   | 58.74                   | +1.26                  | 1.0                            |
| 80                     | 160 Hz        |      | 80.00                   | 78.11                   | +1.89                  | 1.0                            |
| 100                    | 160 Hz        |      | 100.00                  | 97.62                   | +2.38                  | 1.0                            |

Note: The Scope of Accredited TISI Certificate No. 23-LB0092 Issue 02 Page 62 of 138

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

### End of Certificate ###



@clcalibration

**REPORT OF CALIBRATION**

**FOR**

NOMENCLATURE : VIBRATION METER  
MANUFACTURER : VIBROCK  
MODEL / TYPE : V9000  
SERIAL NO. : 2350  
DATE OF CALIBRATION : 19 November 2025

**ENVIRONMENT CONDITIONS :**

Temperature : (23 ± 2) °C

Relative Humidity : (55 ± 15) %RH

**PROCEDURE USED :**

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

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

**REFERENCE STANDARD USED :**

1. Programmable Timer/Counter, Philips Model PM6680B S/N: SM607101.
2. Digital Multimeter, Keysight Technologies Model 3458A S/N: MY59352733.
3. Accelerometer with Measuring Amplifier, Briel & Kjaer Model 8305, 2525 S/N: 397018, 2434988.

**TRACEABILITY :**

1. The measurements are traceable to International System of Units (SI), through Aeronautical Radio of Thailand Ltd. Certificate No. 07-0054/25 , Due Date 11 June 2026.
2. The measurements are traceable to International System of Units (SI), through National Institute of Metrology (Thailand) Certificate No. EE-0090-25, Due Date 31 July 2026.
3. The measurements are traceable to International System of Units (SI), through National Institute of Metrology (Thailand) Certificate No. AV-0056-24, Due Date 14 December 2025.

**UNCERTAINTY :**

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

Certificate No. Q25136392

F3-011-05/12-23



@clcalibration

## REPORT OF CALIBRATION

### FOR

|                     |   |                  |
|---------------------|---|------------------|
| NOMENCLATURE        | : | VIBRATION METER  |
| MANUFACTURER        | : | VIBROCK          |
| MODEL / TYPE        | : | V9000            |
| SERIAL NO.          | : | 2351             |
| DATE OF CALIBRATION | : | 10 November 2025 |

#### ENVIRONMENT CONDITIONS :

Temperature :  $(23 \pm 2) ^\circ\text{C}$  Relative Humidity :  $(55 \pm 15) \% \text{RH}$

#### PROCEDURE USED :

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

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

#### REFERENCE STANDARD USED :

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

#### TRACEABILITY :

1. The measurements are traceable to International System of Units (SI), through National Institute of Metrology (Thailand) Certificate No. EE-0143-24, Due Date 06 December 2025.
2. The measurements are traceable to International System of Units (SI), through Aeronautical Radio of Thailand Ltd. Certificate No. 07-0054/25 , Due Date 11 June 2026.
3. The measurements are traceable to International System of Units (SI), through National Institute of Metrology (Thailand) Certificate No. AV-0051-24, Due Date 13 December 2025.

#### UNCERTAINTY :

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

Certificate No. Q25131718

F3-011-05/12-23

page 2 of 3



@ckcalibration

## CERTIFICATE OF CALIBRATION

### FOR

|                     |   |                                                                                    |
|---------------------|---|------------------------------------------------------------------------------------|
| NOMENCLATURE        | : | VIBRATION METER                                                                    |
| MANUFACTURER        | : | VIBROCK                                                                            |
| MODEL / TYPE        | : | V9000                                                                              |
| SERIAL NO.          | : | 2351                                                                               |
| CLID. NO.           | : | 252101273                                                                          |
| JOB CONTROL NO.     | : | 251107131718                                                                       |
| CALIBRATION SERVICE | : | <input checked="" type="checkbox"/> IN-LABORATORY <input type="checkbox"/> ON-SITE |

CUSTOMER : ENVIRONMENTAL MEASUREMENTS CO., LTD.

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

DATE OF RECEIVED : 07 November 2025

DATE OF ISSUED : 12 November 2025

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

Calibrated By :

Calibration Engineer



Approved By :

Authorized Signatory

12 November 2025

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

Certificate No. Q25131718

F3-011-05/12-23

page 1 of 3



@ckcalibration



SCARLET TECH

# Certificate of Calibration

## WL-21 Wireless Anemometer

Scarlet Tech Ltd. hereby certifies that the WL-21 wireless anemometer listed below was thoroughly calibrated, test and inspected following the standard calibration procedure (st-wl-21) and is within manufacture's specification at the time when the calibration is done.

Client: Envir Service Co., Ltd.  
Serial: 2504DR0038 Sensor 2504DT0058  
Calibration Date: 2025/10/8  
Calibration Expiry Date: 2026/10/7

### The Result of Calibration

| Velocity             |                    |           |           |
|----------------------|--------------------|-----------|-----------|
| Measured Value (m/s) | Actual Value (m/s) | Deviation | Tolerance |
| 1.0                  | 1.0                | 0.0       | 0.9-1.1   |
| 1.8                  | 2.0                | 0.2       | 1.8-2.2   |
| 4.7                  | 5.0                | 0.3       | 4.7-5.3   |
| 6.9                  | 7.0                | 0.1       | 6.0-8.0   |
| 9.8                  | 10.0               | 0.2       | 9.5-10.5  |
| 19.8                 | 20.0               | 0.2       | 19.0-21.0 |
| Result               |                    |           |           |
| Pass                 |                    |           |           |

| Wind Direction       |                    |           |           |
|----------------------|--------------------|-----------|-----------|
| Measured Value (m/s) | Actual Value (m/s) | Deviation | Tolerance |
| 46°                  | 45°                | 1         | 42-48     |
| 136°                 | 135°               | 1         | 132-138   |
| 225°                 | 225°               | 0         | 222-228   |
| 314°                 | 315°               | 1         | 312-318   |
| 359°                 | 0°                 | 1         | 357-3     |
| Result               |                    |           |           |
| Pass                 |                    |           |           |

| Inspection Room Temp | Actual Value | Deviation | Tolerance | Result |
|----------------------|--------------|-----------|-----------|--------|
| 22.2°C               | 22.5         | 0.3       | 21.5-23.5 | Pass   |

| Atmospheric Pressure Inspection | Actual Value | Deviation | Tolerance | Result |
|---------------------------------|--------------|-----------|-----------|--------|
| 1007                            | 1005         | 2         | 1001-1019 | Pass   |

### Environment Conditions:

Air temperature: 22 °C  
Relative humidity: 55 %  
Static pressure: 102.2 kPa

Performed by:



Certified by Head of Engineering

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### VELOCITY RESULT

| Test point |             | Mode | STD Reading (mm/s) | DUC Reading (mm/s) | Correction (mm/s) | Uncertainty ± (% of rdg.) |
|------------|-------------|------|--------------------|--------------------|-------------------|---------------------------|
| (mm/s)     | (frequency) |      |                    |                    |                   |                           |
| 10         | 160 Hz      | peak | 10.00              | 9.85               | +0.15             | 1.1                       |
| 20         | 160 Hz      |      | 20.00              | 19.51              | +0.49             | 1.0                       |
| 40         | 160 Hz      |      | 40.00              | 39.34              | +0.66             | 1.0                       |
| 60         | 160 Hz      |      | 60.00              | 58.98              | +1.02             | 1.0                       |
| 80         | 160 Hz      |      | 80.00              | 78.62              | +1.38             | 1.0                       |
| 100        | 160 Hz      |      | 100.00             | 97.51              | +2.49             | 1.0                       |

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

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

### End of Certificate ###

Certificate No. Q25131718  
F3-011-05/12-23





CALIBRATION LABORATORY CO., LTD.

210-11, 14, 55 Soi Prasert Manukit 29 Yaek 4, Prasert Manukit Rd., Ladphrao, Bangkok 10230  
Tel. 02-578-0353-4 Fax: 02-578-2672 www.cal-laboratory.com Email: sale@cal-laboratory.com



## CERTIFICATE OF CALIBRATION

### FOR

NOMENCLATURE : PRIMARY FLOW CALIBRATOR  
MANUFACTURER : MESALABS  
MODEL / TYPE : DEFENDER 510-M  
SERIAL NO. : 172525  
CLID. NO. : 212401789  
JOB CONTROL NO. : 251107131507  
CALIBRATION SERVICE : ☒ IN-LABORATORY ☐ ON-SITE  
CUSTOMER : ENVIRONMENTAL MEASUREMENTS CO., LTD.  
545 BAAN KLANG KRUNG BIZ TOWN, SOI SRINAGARINDRA 46/1 (PRAMOTE),  
NONG BON SUB-DISTRICT, PRAWET DISTRICT, BANGKOK 10250

DATE OF RECEIVED : 07 November 2025

DATE OF ISSUED : 11 November 2025

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

Calibrated By :

Calibration Engineer



Approved By :

Authorized Signatory

11 November 2025

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

Certificate No. Q25131507

F3-011-05/12-23

page 1 of 3



@calibration



SCARLET TECH

## Certificate of Calibration

### WL-21 Wireless Anemometer

Scarlet Tech Ltd. hereby certifies that the WL-21 wireless anemometer listed below was thoroughly calibrated, test and inspected following the standard calibration procedure (st-wl-21) and is within manufacture's specification at the time when the calibration is done.

Client: Envir Service Co., Ltd.  
Serial: 2504DR0060 Sensor 2504DT0060  
Calibration Date: 2025/10/8  
Calibration Expiry Date: 2026/10/7

### The Result of Calibration

| Velocity             |                    |           |        |
|----------------------|--------------------|-----------|--------|
| Measured Value (m/s) | Actual Value (m/s) | Deviation | Result |
| 1.0                  | 1.0                | 0.0       | Pass   |
| 2.1                  | 2.0                | 0.1       | Pass   |
| 4.8                  | 5.0                | 0.2       | Pass   |
| 6.9                  | 7.0                | 0.1       | Pass   |
| 9.9                  | 10.0               | 0.1       | Pass   |
| 19.8                 | 20.0               | 0.2       | Pass   |

| Wind Direction       |                    |           |        |
|----------------------|--------------------|-----------|--------|
| Measured Value (m/s) | Actual Value (m/s) | Deviation | Result |
| 46°                  | 45°                | 1         | Pass   |
| 136°                 | 135°               | 1         | Pass   |
| 225°                 | 225°               | 0         | Pass   |
| 314°                 | 315°               | 1         | Pass   |
| 359°                 | 0°                 | 1         | Pass   |

| Inspection Room Temp | Actual Value | Deviation | Tolerance | Result |
|----------------------|--------------|-----------|-----------|--------|
| 22.2°C               | 22.5         | 0.3       | 21.5-23.5 | Pass   |

| Atmospheric Pressure Inspection | Actual Value | Deviation | Tolerance | Result |
|---------------------------------|--------------|-----------|-----------|--------|
| 1007                            | 1005         | 2         | 1001-1019 | Pass   |

### Environment Conditions:

Air temperature: 22 °C  
Relative humidity: 55 %  
Static pressure: 102.2 kPa

Performed by: \_\_\_\_\_  
Certified by Head of Engineering Department



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Sec., Heping E. Rd., Daan Dist. Taipei City 106, Taiwan



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



ANAB National Accreditation Board  
ACCREDITED  
CALIBRATION AND  
DIMENSIONAL MEASUREMENT  
ACDM 2814



CLC  
Accredited  
ISO/IEC 17025

## CONDITION OF CALIBRATION ITEM : RECEIVED IN GOOD OPERATIONAL CONDITION

### MEASUREMENT RESULTS : ( X ) without adjustment ( ) adjustment

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

#### CALIBRATION DATA

| STD Applied<br>( L / min ) | DUC Reading<br>( L / min ) | Correction<br>( L / min ) | Uncertainty<br>± ( L / min ) |
|----------------------------|----------------------------|---------------------------|------------------------------|
| 0.5000                     | 0.50521                    | -0.00521                  | 0.57735                      |
| 1.0000                     | 1.0160                     | -0.0160                   | 0.5774                       |
| 2.0000                     | 2.0431                     | -0.0431                   | 0.5774                       |
| 5.0000                     | 5.1149                     | -0.1149                   | 0.5781                       |

Technical Note. Media of Gas : Air

Setting Temperature 23 ° C ; Pressure 101.3 kPa

Note. The Scope of Accredited ANAB Certificate No. ACDM-2814 Version 016 Page 52 of 73

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

### End of Certificate ###

Certificate No. Q25131507  
F3-011-05/12-23



@clccalibration



CLC  
Accredited  
ISO/IEC 17025

# CALIBRATION LABORATORY Co., LTD.

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



ANAB National Accreditation Board  
ACCREDITED  
CALIBRATION AND  
DIMENSIONAL MEASUREMENT  
ACDM 2814

## REPORT OF CALIBRATION

### FOR

NOMENCLATURE : PRIMARY FLOW CALIBRATOR  
MANUFACTURER : MESALABS  
MODEL / TYPE : DEFENDER 510-M  
SERIAL NO. : 172525  
DATE OF CALIBRATION : 10 November 2025

#### ENVIRONMENT CONDITIONS :

Temperature : ( 23 ± 2 ) ° C

Relative Humidity : ( 55 ± 10 ) % RH

#### PROCEDURE USED :

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

#### REFERENCE STANDARD USED :

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

#### TRACEABILITY :

The measurements are traceable to International System of Units (SI), through Chell Instrument Ltd.  
Certificate No. N039747, Due Date 02 April 2026.

#### UNCERTAINTY :

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

Certificate No. Q25131507  
F3-011-05/12-23



@clccalibration

Request No. : 22-69 / 0084  
Serial No. : A.067438

MTC No. : PSL-P 0023 / 69

**Results :**

| UUC<br>Range (lux)       | Standard<br>(lux) | *UUC Reading<br>(lux) | Uncertainty of<br>Measurement $\pm$ (lux) |
|--------------------------|-------------------|-----------------------|-------------------------------------------|
| 2000                     | 100               | 104                   | 2.1                                       |
|                          | 500               | 505                   | 11                                        |
|                          | 1000              | 997                   | 21                                        |
|                          | 1500              | 1491                  | 31                                        |
|                          | 2000              | 1982                  | 41                                        |
| 20000<br>( $\times 10$ ) | 2000              | 199                   | 41                                        |
|                          | 3000              | 298                   | 61                                        |
|                          | 4000              | 395                   | 81                                        |
|                          | 5000              | 493                   | 101                                       |

Note : \*UUC = Unit Under Calibration.

...end of certificate...

Calibrated by :

Approved by :

**Photometry and Temperature Standards Laboratory**

Ref. : 2012268111404571001  
Issued date : 21 November 2025

page 2 of 2

The results relate only to the items tested/calibrated or value assigned.  
Advertising the Report/Certificate and publicity of the results except in full are prohibited unless written permission is obtained from the governor of TISTR.

**Head Office**  
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Tel. (66) 0 2577 9036  
Fax. (66) 0 2577 9009  
E-mail : mt@tistr.or.th Website : www.tistr.or.th

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

**Head Office**  
35 Mu 3 Tambon Khlong Ha, Amphoe Khlong Luang,  
Changwat Pathumthani 12120, Thailand  
Tel. (66) 0 2577 9036  
Fax. (66) 0 2577 9009  
E-mail : mt@tistr.or.th Website : www.tistr.or.th

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

FMBL.MTC.002 Rev.5

Request No. : 22-69 / 0084

MTC No. : PSL-P 0023 / 69

## CERTIFICATE OF CALIBRATION

Nomenclature : Digital Lux Meter  
Maker : EXTECH Instruments  
Serial No. : A.067438  
Model : 407026

Customer : ENVIRONMENTAL MEASUREMENTS CO., LTD.  
Address : 5/45 Baan Klang Krung Biz Town, Soi Srinagarindra 46/1 (Promote)  
Nong Bon Sub-District, Prawet District, Bangkok 10250

Date of receipt : 14 November 2025

Date of calibration : 19 November 2025

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

Basis of calibration : calibration at 0 ~ 5000 lux.

Condition of calibration : - Ambient temperature :  $(25 \pm 2)$  °C

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

Reference Standard : Working Standard Luminous Intensity Lamp, Serial No.: FEL003, can be traceable to international system of units (SI), through calibration certificate MTC No. PSL-P 0113/68, date of calibration 8 May 2025.

Traceability : This certificate is traceable to SI units through the National Institute of Metrology (Thailand).

calibration certificate No. TP-1002-25, TP-11003-25 and TP-1004-25

Support Equipment : 1. Photometric bench , 3.0 meter long

2. DC power supply, Serial No.: MY41001705

3. Digital Multimeter, Model : 3458A , S/N : MY59351760

Calibration Procedure : The measurement was done in accordance with WLC.P.10.

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

page 1 of 2

R.P.

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

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**Head Office**  
35 Mu 3 Tambon Khlong Ha, Amphoe Khlong Luang,  
Changwat Pathumthani 12120, Thailand  
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Fax. (66) 0 2577 9009  
E-mail : mt@tistr.or.th Website : www.tistr.or.th

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

FMBL.MTC.002 Rev.5



MM-C35



## REPORT OF CALIBRATION

### FOR

NOMENCLATURE : BALANCE  
MANUFACTURER : METTLER TOLEDO  
MODEL / TYPE : MS204TS/00  
SERIAL NO. : B935191252[LA-002]  
LOCATION SITE : LABORATORY - BALANCE ROOM  
DATE OF CALIBRATION : 04 February 2026

#### ENVIRONMENT CONDITIONS :

Temperature : 22 °C to 23 °C Relative Humidity : 52 % to 54 %

#### PROCEDURE USED :

This instrument was calibrated under procedure No. WI-305-46 based on EURAMET cg-18 Version 4.0 (11/2015).

The calibration was performed by Comparison with Standard Weight which maintained by the Calibration Laboratory Co., Ltd.

#### REFERENCE STANDARD USED :

Standard Weight, W&J Class E2 S/N. 1228.

#### TRACEABILITY :

The measurements are traceable to International System of Units (SI), through Calibration Laboratory Co., Ltd.  
Certificate No.Q25059626 , Due Date 28 May 2027.

#### UNCERTAINTY :

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

Certificate No. Q26013128

F3-011-05/12-23

page 2 of 3



@clcalibration



## CERTIFICATE OF CALIBRATION

### FOR

NOMENCLATURE : BALANCE  
MANUFACTURER : METTLER TOLEDO  
MODEL / TYPE : MS204TS/00  
SERIAL NO. : B935191252[LA-002]  
CLID. NO. : 362200356  
JOB CONTROL NO. : 260130013128  
CALIBRATION SERVICE : ☐ IN-LABORATORY ☒ ON-SITE

CUSTOMER : ENVIRONMENTAL MEASUREMENTS CO., LTD.

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

DATE OF RECEIVED : 30 January 2026

DATE OF ISSUED : 11 February 2026

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

Calibrated By :

Calibration Engineer



Approved By :

Authorized Signatory

11 February 2026

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

Certificate No. Q26013128

F3-011-05/12-23

page 1 of 3



@clcalibration

## REPORT OF CALIBRATION

### FOR

**NOMENCLATURE** : BALANCE  
**MANUFACTURER** : SHIMADZU  
**MODEL / TYPE** : AP225WD  
**SERIAL NO.** : D376300692[LA-001]  
**LOCATION SITE** : LABORATORY-BALANCE ROOM  
**DATE OF CALIBRATION** : 04 February 2026

#### ENVIRONMENT CONDITIONS :

Temperature : 22 °C to 23 °C

Relative Humidity : 52 % to 54 %

#### PROCEDURE USED :

This instrument was calibrated under procedure No. WI-305-46 based on EURAMET cg-18 Version 4.0 (11/2015).

The calibration was performed by Comparison with Weight Set which maintained by the Calibration Laboratory Co., Ltd.

#### REFERENCE STANDARD USED :

Standard weight, W&amp;J Class E2 S.N. 1228

#### TRACEABILITY :

The measurements are traceable to International System of Units (SI), through Calibration Laboratory Co., Ltd.

Certificate No. Q25059626, Due Date 28 May 2026.

#### UNCERTAINTY :

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

Certificate No. Q26013127

F3-011-05/12-23

page 2 of 3



@clcalibration

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

#### CALIBRATION DATA

##### 1. Error of indications

| Nominal Test Value (g) | Conventional mass (g) | Display Value (g) | Error of Balance (g) | Uncertainty ± (mg) | Coverage factor k |
|------------------------|-----------------------|-------------------|----------------------|--------------------|-------------------|
| Unload                 | 0.0000                | 0.0000            | 0.0000               | 0.07               | 2.00              |
| 0.1000                 | 0.1000                | 0.1000            | 0.0000               | 0.15               | 2.00              |
| 0.5000                 | 0.5000                | 0.5000            | 0.0000               | 0.15               | 2.00              |
| 1.0000                 | 1.0000                | 1.0000            | 0.0000               | 0.15               | 2.00              |
| 2.0000                 | 2.0000                | 2.0001            | +0.0001              | 0.15               | 2.00              |
| 5.0000                 | 5.0000                | 5.0000            | 0.0000               | 0.15               | 2.00              |
| 10.0000                | 10.0000               | 10.0001           | +0.0001              | 0.15               | 2.00              |

##### 2. Repeatability of indications

| Nominal Test Value (g) | Standard Deviation of Reading (g) |
|------------------------|-----------------------------------|
| 10.0000                | 0.00005                           |

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

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

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

### End of Certificate ###

Certificate No. Q26013128

F3-011-05/12-23

page 3 of 3



@clcalibration



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

CALIBRATION DATA

1. Error of indications

| Nominal Test Value ( g ) | Conventional mass ( g ) | Display Value ( g ) | Error of Balance ( g ) | Uncertainty $\pm$ ( mg ) | Coverage factor $k$ |
|--------------------------|-------------------------|---------------------|------------------------|--------------------------|---------------------|
| Unload                   | 0.0000                  | 0.0000              | 0.0000                 | 0.07                     | 2.00                |
| 1.0000                   | 1.0000                  | 1.0000              | 0.0000                 | 0.15                     | 2.00                |
| 10.0000                  | 10.0000                 | 10.0000             | 0.0000                 | 0.15                     | 2.00                |
| 20.0000                  | 20.0000                 | 20.0000             | 0.0000                 | 0.16                     | 2.00                |
| 40.0000                  | 40.0000                 | 39.9999             | -0.0001                | 0.18                     | 2.00                |
| 60.0000                  | 60.0000                 | 59.9999             | -0.0001                | 0.18                     | 2.00                |
| 80.0000                  | 80.0000                 | 79.9999             | -0.0001                | 0.21                     | 2.00                |
| 100.0000                 | 100.0000                | 100.0000            | 0.0000                 | 0.17                     | 2.00                |
| 120.0000                 | 120.0000                | 120.0000            | 0.0000                 | 0.22                     | 2.00                |
| 140.0000                 | 140.0000                | 139.9999            | -0.0001                | 0.24                     | 2.00                |
| 160.0000                 | 160.0000                | 159.9998            | -0.0002                | 0.24                     | 2.00                |
| 180.0000                 | 179.9999                | 179.9998            | -0.0001                | 0.27                     | 2.00                |
| 200.0000                 | 200.0000                | 199.9997            | -0.0003                | 0.24                     | 2.00                |

2. Repeatability of indications

| Nominal Test Value ( g ) | Standard Deviation of Reading ( g ) |
|--------------------------|-------------------------------------|
| 200.0000                 | 0.000063                            |

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

|                          |                     |            |            |            |                                          |
|--------------------------|---------------------|------------|------------|------------|------------------------------------------|
|                          |                     |            |            |            |                                          |
|                          | Display Value ( g ) |            |            |            |                                          |
|                          | Position 1          | Position 2 | Position 3 | Position 4 | Position 5                               |
| Nominal Test Value ( g ) | 100.0000            | 99.9999    | 100.0000   | 99.9999    | 99.9998                                  |
| 100.0000                 | 100.0000            | 99.9999    | 100.0000   | 99.9998    | 99.9998                                  |
|                          |                     |            |            |            | Maximum Difference of Center Value ( g ) |
|                          |                     |            |            |            | 0.0002                                   |

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

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

### End of Certificate ###

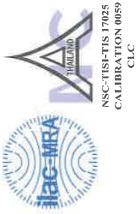
Certificate No. Q26013127

F3-011-05/12-23

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@clcalibration



CERTIFICATE OF CALIBRATION

FOR

NOMENCLATURE : BALANCE  
MANUFACTURER : SHIMADZU  
MODEL / TYPE : AP225WD  
SERIAL NO. : D376300692[LA-001]  
CLID. NO. : 362100172  
JOB CONTROL NO. : 260130013127  
CALIBRATION SERVICE : ☐ IN-LABORATORY ☒ ON-SITE

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

DATE OF RECEIVED : 30 January 2026

DATE OF ISSUED : 07 February 2026

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

Calibrated By :

Chonvit Thongnat

Calibration Engineer



Approved By :

Mongkol Yotsoontorn

Authorized Signatory

07 February 2026

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

Certificate No. Q26013127

F3-011-05/12-23

page 1 of 3



@clcalibration



## REPORT OF CALIBRATION

### FOR

NOMENCLATURE : DO METER  
MANUFACTURER : YSI  
MODEL / TYPE : 5000-230V/5010  
SERIAL NO. : 16D101626/19D100367[DOM-01]  
DATE OF CALIBRATION : 28 January 2026

#### ENVIRONMENT CONDITIONS :

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

#### PROCEDURE USED :

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

#### REFERENCE STANDARD USED :

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

#### TRACEABILITY :

The measurements are traceable to International System of Units (SI), through Sigma-Aldrich USA.  
Lot LRAD8571, Due Date April 2026.

#### UNCERTAINTY :

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

Certificate No. Q26011808  
F3-011-05/12-23



## CERTIFICATE OF CALIBRATION

### FOR

NOMENCLATURE : DO METER  
MANUFACTURER : YSI  
MODEL / TYPE : 5000-230V/5010  
SERIAL NO. : 16D101626/19D100367[DOM-01]  
CLID. NO. : 272100329  
JOB CONTROL NO. : 260127011808  
CALIBRATION SERVICE : ☒ IN-LABORATORY ☐ ON-SITE

#### CUSTOMER :

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

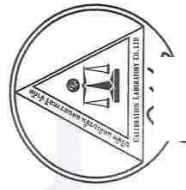
DATE OF RECEIVED : 27 January 2026

DATE OF ISSUED : 29 January 2026

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

#### Calibrated By :

Calibration Engineer



#### Approved By :

Authorized Signatory

29 January 2026

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

Certificate No. Q26011808  
F3-011-05/12-23





## CERTIFICATE OF CALIBRATION

### FOR

NOMENCLATURE : HOT AIR OVEN  
MANUFACTURER : MEMMERT  
MODEL / TYPE : UF110  
SERIAL NO. : B422.0026[LA-0012]  
CLID. NO. : 33202464  
JOB CONTROL NO. : 260130013129  
CALIBRATION SERVICE : ☐ IN-LABORATORY ☒ ON-SITE  
CUSTOMER : ENVIRONMENTAL MEASUREMENTS CO., LTD.  
5/45 BAAN KLANG KRUNG BIZ TOWN, SOI SRINAGARINDRA 46/1 (PRAMOTE),  
NONG BON SUB-DISTRICT, PRAWET DISTRICT, BANGKOK 10250

DATE OF RECEIVED : 30 January 2026

DATE OF ISSUED : 09 February 2026

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

Calibrated By :

Calibration Engineer



Approved By :

Authorized Signatory  
09 February 2026

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

Certificate No. Q26013129

F3-011-05/12-23

page 1 of 4



@clcalibration

### CALIBRATION DATA

DO METER RESULT @ 20 °C

| Nominal Value<br>(mg/L) | DUC Reading<br>(mg/L) | Correction<br>(mg/L) | Uncertainty<br>(mg/L) |
|-------------------------|-----------------------|----------------------|-----------------------|
| 8.18                    | 8.22                  | -0.04                | ± 0.38                |

Note. The Scope of Accredited ANAB Certificate No. ACDM-2814 Version 018 Page 5 of 73

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

### End of Certificate ###

Certificate No. Q26011808

F3-011-05/12-23

page 3 of 3



@clcalibration



MM-C35



**CONDITION OF CALIBRATION ITEM : RECEIVED IN GOOD OPERATIONAL CONDITION**

**MEASUREMENT RESULTS : ( X ) without adjustment ( ) adjustment**

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

**CALIBRATION DATA**

**1. HOT AIR OVEN PERFORMANCE**

| Setting ( °C ) | DUC               |      | Measured Uniformity ( °C ) | Measured Stability ( °C ) | Measured Overall Variation ( °C ) |
|----------------|-------------------|------|----------------------------|---------------------------|-----------------------------------|
|                | Indicating ( °C ) |      |                            |                           |                                   |
| 104.0          | 104.0             | 0.29 | 0.16                       | 0.55                      |                                   |
| 180.0          | 180.0             | 1.08 | 0.38                       | 2.16                      |                                   |

Certificate No. Q26013129  
F3-011-05/12-23

page 3 of 4



@cccalibration



**REPORT OF CALIBRATION**

**FOR**

NOMENCLATURE : HOT AIR OVEN  
MANUFACTURER : MEMMERT  
MODEL / TYPE : UF110  
SERIAL NO. : B422.0026[LA-0012]  
LOCATION SITE : LABORATORY - HOT ZONE  
DATE OF CALIBRATION : 04 February 2026

**ENVIRONMENT CONDITIONS :**

Temperature : 24 °C to 25 °C Relative Humidity : 48% to 52 %

**PROCEDURE USED :**

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

**REFERENCE STANDARD USED :**

Hydra Series II, Fluke Model 2635A S/N. 1700013.

**TRACEABILITY :**

The measurements are traceable to International System of Units (SI) , through Calibration Laboratory Co., Ltd.  
Certificate No. Q25059630, Due Date 02 June 2026.

**UNCERTAINTY :**

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

Certificate No. Q26013129  
F3-011-05/12-23

page 2 of 4



@cccalibration



# CALIBRATION LABORATORY CO., LTD.

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



## CERTIFICATE OF CALIBRATION

### FOR

NOMENCLATURE : INCUBATOR  
MANUFACTURER : ACCUPLUS  
MODEL / TYPE : SMART 1250  
SERIAL NO. : 2059-0718-0010[LA-002]  
CLID. NO. : 332100155  
JOB CONTROL NO. : 260130013130  
CALIBRATION SERVICE : ☐ IN-LABORATORY ☒ ON-SITE  
CUSTOMER : ENVIRONMENTAL MEASUREMENTS CO., LTD.  
5/45 BAAN KLANG KRUNG BIZ TOWN, SOI SRINAGARINDRA 46/1 (PRAMOTE),  
NONG BON SUB-DISTRICT, PRAWET DISTRICT, BANGKOK 10250

DATE OF RECEIVED : 30 January 2026

DATE OF ISSUED : 09 February 2026

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

Calibrated By :

Calibration Engineer



Approved By :

Authorized Signatory

09 February 2026

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

Certificate No. Q26013130

F3-011-05/12-23

page 1 of 4



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# CALIBRATION LABORATORY CO., LTD.

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



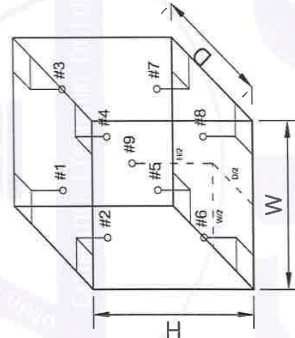
## CALIBRATION DATA

### 2. TEMPERATURE DISTRIBUTION

| DUC   | Setting (°C) | Indicating (°C) | Measured Temperature (°C) @ Probe No.9 is Ref. |        |        |        |        |        |        |        |        | Uncertainty<br>± (°C) | Coverage<br>factor k |
|-------|--------------|-----------------|------------------------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|-----------------------|----------------------|
|       |              |                 | 1                                              | 2      | 3      | 4      | 5      | 6      | 7      | 8      | 9      |                       |                      |
| 104.0 | 104.0        | 104.0           | 103.65                                         | 103.93 | 103.70 | 104.00 | 103.69 | 103.94 | 103.69 | 103.94 | 103.91 | 0.21                  | 2.00                 |
| 180.0 | 180.0        | 180.0           | 178.96                                         | 178.84 | 179.84 | 180.32 | 178.74 | 180.02 | 179.09 | 180.34 | 179.69 | 0.51                  | 2.00                 |

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

Note. The Scope of Accredited ANAB Certificate No. ACDM-2814 Version 018 Page 63 of 73



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

### End of Certificate ###

Certificate No. Q26013129

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**CONDITION OF CALIBRATION ITEM : RECEIVED IN GOOD OPERATIONAL CONDITION**

**MEASUREMENT RESULTS : ( X ) without adjustment ( ) adjustment**

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

**CALIBRATION DATA**

**1. INCUBATOR PERFORMANCE**

| Setting ( °C ) | DUC               |  | Measured Uniformity<br>( °C ) | Measured Stability<br>( °C ) | Measured Overall<br>Variation ( °C ) |
|----------------|-------------------|--|-------------------------------|------------------------------|--------------------------------------|
|                | Indicating ( °C ) |  |                               |                              |                                      |
| 20.0           | 20.0              |  | 0.59                          | 0.36                         | 0.81                                 |

Certificate No. Q26013130

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**REPORT OF CALIBRATION**

**FOR**

**NOMENCLATURE** : INCUBATOR  
**MANUFACTURER** : ACCUPLUS  
**MODEL / TYPE** : SMART i250  
**SERIAL NO.** : 2059-0718-0010[L.A-002]  
**LOCATION SITE** : LABORATORY  
**DATE OF CALIBRATION** : 04 February 2026

**ENVIRONMENT CONDITIONS :**

Temperature : 24 °C to 25 °C

Relative Humidity : 48 % to 52 %

**PROCEDURE USED :**

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

**REFERENCE STANDARD USED :**

Hydra Series II, Fluke Model 2635A S/N: 8209003.

**TRACEABILITY :**

The measurements are traceable to International System of Units (SI), through Calibration Laboratory Co., Ltd.  
Certificate No. Q25044222, Due Date 21 April 2026.

**UNCERTAINTY :**

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

Certificate No. Q26013130

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@clcalibration



MM-C35



# CALIBRATION LABORATORY CO., LTD.

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



## CERTIFICATE OF CALIBRATION

### FOR

NOMENCLATURE : pH METER  
MANUFACTURER : APERA  
MODEL / TYPE : PH700/201T-F  
SERIAL NO. : PH700X1019061009/N/A [LA-008/PH-02]  
CLID. NO. : 272401000  
JOB CONTROL NO. : 260127011809  
CALIBRATION SERVICE : ☒ IN-LABORATORY ☐ ON-SITE

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

DATE OF RECEIVED : 27 January 2026 DATE OF ISSUED : 29 January 2026  
The report of calibration shall not be reproduced except in full without approval of the Calibration Laboratory Co., Ltd.

Calibrated By :

Calibration Engineer



Approved By :

Authorized Signatory

29 January 2026

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

Certificate No. Q26011809

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@clcalibration



# CALIBRATION LABORATORY CO., LTD.

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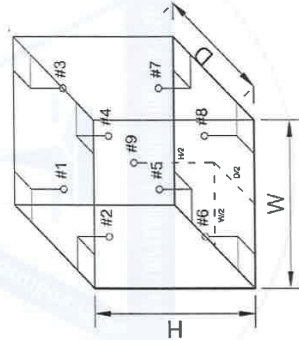
## CALIBRATION DATA

### 2. TEMPERATURE DISTRIBUTION

| DUC          |                 | Measured Temperature (°C) @Probe No.9 is Ref. |       |       |       |       |       |       |       | Uncertainty<br>± (°C) | Coverage<br>factor k |
|--------------|-----------------|-----------------------------------------------|-------|-------|-------|-------|-------|-------|-------|-----------------------|----------------------|
| Setting (°C) | Indicating (°C) | 1                                             | 2     | 3     | 4     | 5     | 6     | 7     | 8     | 9                     |                      |
| 20.0         | 20.0            | 20.63                                         | 20.71 | 20.61 | 20.43 | 20.53 | 20.50 | 20.53 | 20.56 | 20.38                 | 2.00                 |

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

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



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

### End of Certificate ###

Certificate No. Q26013130

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@clcalibration



CALIBRATION LABORATORY Co., LTD.

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



#### TRACEABILITY :

1. The measurements are traceable to International System of Units (SI), through National Institute of Metrology (Thailand).  
Lot Number: 191025, 241025. Due Date 24 December 2026.
2. The measurements are traceable to International System of Units (SI), through Control Company.  
Certificate No. 4288-15743843, Due Date 27 February 2027.
3. The measurements are traceable to International System of Units (SI), through Calibration Laboratory Co., Ltd.  
Certificate No. Q25097314, Due Date 29 August 2026.
4. The measurements are traceable to International System of Units (SI), through Thailand Institute of Scientific and Technological Research (TISTR). Certificate No. PSL-T 0177/68, Due Date 10 February 2026.
5. The measurements are traceable to International System of Units (SI), through National Institute of Metrology (Thailand).  
Certificate No. TT-1008-25, Due Date 04 March 2026.

#### UNCERTAINTY :

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor complies with the table which for a normal distribution corresponds to a coverage probability of approximately 95 %.

It has been evaluated according to the "Evaluation of the Uncertainty of Measurement in Calibration (EA-4/02 M:2022)"

Certificate No. Q26011809  
F3-011-05/12-23

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@clcalibration



CALIBRATION LABORATORY Co., LTD.

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



## REPORT OF CALIBRATION

### FOR

NOMENCLATURE : pH METER  
MANUFACTURER : APERA  
MODEL / TYPE : PH700/201T-F  
SERIAL NO. : PH700X1019061009/N/A [LA-008/PH-02]  
DATE OF CALIBRATION : 28 January 2026

#### ENVIRONMENT CONDITIONS :

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

#### PROCEDURE USED :

This instrument was calibrated under procedure No. WI-305-128, WI-305-238. The calibration was performed by direct measurement with Certified Reference Material (CRM) and comparison with Temperature Bath, Precision Thermometer and IPRT which maintained by the Calibration Laboratory Co., Ltd.

#### REFERENCE STANDARD USED :

1. pH Standard Solution, NIMT TRM CODE TRM-S-2003, TRM CODE TRM-S-2007.
2. pH Standard Solution, Control Company Catalog Number 06664263, 11784256, Lot Number CC818772.
3. Temperature Bath, Jingmi Model RTS-35S S/N. 16339.
4. Precision Thermometer, ASL Model F200-A-8 S/N. 014433/03.
5. IPRT, ASL Model T100-250-1D S/N. PO106346-1-13.

Certificate No. Q26011809  
F3-011-05/12-23

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## REPORT OF CALIBRATION

### FOR

**NOMENCLATURE** : WATER BATH  
**MANUFACTURER** : MEMMERT  
**MODEL / TYPE** : WNB14  
**SERIAL NO.** : L418.0758[LA-004]  
**LOCATION SITE** : LABORATORY - HOT ZONE  
**DATE OF CALIBRATION** : 04 February 2026

### ENVIRONMENT CONDITIONS :

Temperature : 24 °C to 25 °C  
Relative Humidity : 48% to 52%

### PROCEDURE USED :

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

### REFERENCE STANDARD USED :

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

### TRACEABILITY :

The measurements are traceable to International System of Units (SI) , through Calibration Laboratory Co., Ltd.  
Certificate No. Q25111569, Due Date 24 March 2026.

### UNCERTAINTY :

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

Certificate No. Q26013132  
F3-011-05/12-23



## CONDITION OF CALIBRATION ITEM : RECEIVED IN GOOD OPERATIONAL CONDITION

## MEASUREMENT RESULTS : ( X ) without adjustment ( ) adjustment

The table in the following gives the calibration results and associated measurement uncertainties of pH meter.

### CALIBRATION DATA

#### 1. pH METER RESULT @ 25 °C

| Standard pH Buffer Solution (pH) | pH Meter Reading (pH) | pH Meter Reading (mV) | Correction (pH) | Uncertainty of Measurement ( $\pm$ pH) | k Factor |
|----------------------------------|-----------------------|-----------------------|-----------------|----------------------------------------|----------|
| 4.012                            | 4.00                  | 123                   | +0.012          | 0.014                                  | 2.15     |
| 6.997                            | 7.00                  | -53                   | -0.003          | 0.015                                  | 2.06     |
| 9.994                            | 10.00                 | -220                  | -0.006          | 0.100                                  | 2.00     |

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#### \*2. TEMPERATURE RESULT

| Immersion depth (mm) | Actual Temperature (°C) | DUC Reading (°C) | Correction (°C) | Uncertainty $\pm$ (°C) |
|----------------------|-------------------------|------------------|-----------------|------------------------|
| 100                  | 25.00                   | 25.0             | 0.00            | 0.08                   |

Technical Note. Type of sensor : pH Probe  
Probe  $\varnothing$  12 mm

The reported uncertainty is based on a standard uncertainty multiplied by coverage factor of  $k = 2$ .

Note. \* means Calibrations marked " Not TISI Accredited " in this Certificate have been included for completeness.

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

### End of Certificate ###

Certificate No. Q26011809  
F3-011-05/12-23





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

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

**CALIBRATION DATA**

**1. WATER BATH PERFORMANCE**

| Test Point ( °C ) | DUC Reading ( °C ) | Uniformity ( °C ) | Stability ( °C ) |
|-------------------|--------------------|-------------------|------------------|
| 95.0              | 95.0               | 0.39              | 0.20             |



**CERTIFICATE OF CALIBRATION**

**FOR**

NOMENCLATURE : WATER BATH  
MANUFACTURER : MEMMERT  
MODEL / TYPE : WNB14  
SERIAL NO. : L418.0758[LA-004]  
CLID. NO. : 332100157  
JOB CONTROL NO. : 260130013132  
CALIBRATION SERVICE : ☐ IN-LABORATORY ☒ ON-SITE  
CUSTOMER : ENVIRONMENTAL MEASUREMENTS CO., LTD.

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

DATE OF RECEIVED : 30 January 2026

DATE OF ISSUED : 09 February 2026

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

Calibrated By :

Calibration Engineer



Approved By :

Authorized Signatory  
09 February 2026

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





**CALIBRATION LABORATORY Co., LTD.**  
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## CERTIFICATE OF CALIBRATION

### FOR

NOMENCLATURE : WATER BATH  
MANUFACTURER : M-LAB  
MODEL / TYPE : WBN 15  
SERIAL NO. : 0335[LA-007]  
CLID. NO. : 332300657  
JOB CONTROL NO. : 260130013133  
CALIBRATION SERVICE : ☐ IN-LABORATORY ☒ ON-SITE  
CUSTOMER : ENVIRONMENTAL MEASUREMENTS CO., LTD.  
5/45 BAAN KLANG KRUNG BIZ TOWN, SOI SRINAGARINDRA 46/1 (PRAMOTE),  
NONG BON SUB-DISTRICT, PRAWET DISTRICT, BANGKOK 10250

DATE OF RECEIVED : 30 January 2026

DATE OF ISSUED : 09 February 2026

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Calibrated By :

Calibration Engineer



Approved By :

Authorized Signatory  
09 February 2026

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

Certificate No. Q26013133  
F3-011-05/12-23

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



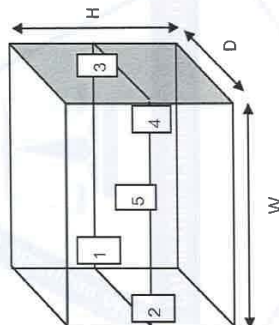
### CALIBRATION DATA

#### 2. TEMPERATURE DISTRIBUTION

| Test Point<br>(°C) | DUC Reading<br>(°C) | STD Reading (°C) |             |             |             |             | Uncertainty<br>± (°C) |
|--------------------|---------------------|------------------|-------------|-------------|-------------|-------------|-----------------------|
|                    |                     | Probe No. 1      | Probe No. 2 | Probe No. 3 | Probe No. 4 | Probe No. 5 |                       |
| 95.0               | 95.0                | 96.25            | 96.15       | 96.08       | 95.99       | 96.03       | 0.52                  |

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

Note. The Scope of Accredited TISI Certificate No. 23-1-B0092 Issue 02 Page 128 of 138



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

### End of Certificate ###

Certificate No. Q26013132  
F3-011-05/12-23

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@elcalibration



**CONDITION OF CALIBRATION ITEM : RECEIVED IN GOOD OPERATIONAL CONDITION**

**MEASUREMENT RESULTS : ( X ) without adjustment ( ) adjustment**

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

**CALIBRATION DATA**

**1. WATER BATH PERFORMANCE**

| Test Point ( °C ) | DUC Reading ( °C ) | Uniformity ( °C ) | Stability ( °C ) |
|-------------------|--------------------|-------------------|------------------|
| 85.0              | 85.0               | 0.21              | 0.14             |

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Certificate No. Q26013133

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@clcalibration

**REPORT OF CALIBRATION**

**FOR**

**NOMENCLATURE** : WATER BATH  
**MANUFACTURER** : M-LAB  
**MODEL / TYPE** : WBN 15  
**SERIAL NO.** : 0335[LA-007]  
**LOCATION SITE** : LABORATORY - HOT ZONE  
**DATE OF CALIBRATION** : 04 February 2026

**ENVIRONMENT CONDITIONS :**

Temperature : 24 °C to 25 °C

Relative Humidity : 48% to 52%

**PROCEDURE USED :**

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

**REFERENCE STANDARD USED :**

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

**TRACEABILITY :**

The measurements are traceable to International System of Units (SI), through Calibration Laboratory Co., Ltd.  
Certificate No. Q25111569, Due Date 24 March 2026.

**UNCERTAINTY :**

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

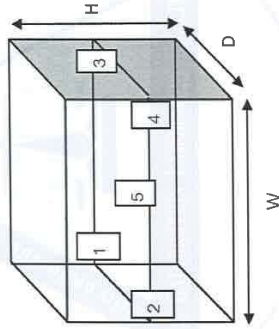
### CALIBRATION DATA

#### 2. TEMPERATURE DISTRIBUTION

| Test Point<br>( ° C ) | DUC Reading<br>( ° C ) | STD Reading ( ° C ) |             |             |             |             | Uncertainty<br>± ( ° C ) |
|-----------------------|------------------------|---------------------|-------------|-------------|-------------|-------------|--------------------------|
|                       |                        | Probe No. 1         | Probe No. 2 | Probe No. 3 | Probe No. 4 | Probe No. 5 |                          |
| 85.0                  | 85.0                   | 84.91               | 84.92       | 84.92       | 84.92       | 84.84       | 0.32                     |

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

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



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

### End of Certificate ###

Certificate No. Q26013133  
F3-011-05/12-23

page 4 of 4



@clcalibration



ที่ อก ๐๓๑๐(๑)/ ๖ ๙ ๗ ๓

กรมโรงงานอุตสาหกรรม  
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท  
เขตราชเทวี กรุงเทพฯ ๑๐๔๐๐

๒ ๕ สิงหาคม ๒๕๖๔

เรื่อง ยกเลิกบุคลากรของห้องปฏิบัติการวิเคราะห์

เรียน กรรมการผู้จัดการ บริษัท ยูไนเต็ด แอนาไลสต์ แอนด์ เอ็นจิเนียริง คอนซัลแตนท์ จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกชน  
ลงวันที่ ๗ สิงหาคม ๒๕๖๔

ตามคำขอที่อ้างถึง บริษัท ยูไนเต็ด แอนาไลสต์ แอนด์ เอ็นจิเนียริง คอนซัลแตนท์ จำกัด  
ห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ๖-๑๔๕ สถานที่ตั้งเลขที่ ๓ ซอยอุดมสุข ๔๑ ถนนสุขุมวิท  
แขวงบางจาก เขตพระโขนง กรุงเทพมหานคร ขอยกเลิกบุคลากร ความละเอียดแจ้งแล้ว นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้อยกเลิกเจ้าหน้าที่ห้องปฏิบัติการวิเคราะห์เอกชน  
จำนวน ๕ ราย ได้แก่

ทะเบียนเลขที่ ๖-  
ทะเบียนเลขที่ ๖-  
ทะเบียนเลขที่ ๖-  
ทะเบียนเลขที่ ๖-  
ทะเบียนเลขที่ ๖-

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

นักวิทยาศาสตร์ฝ่ายขาย วิชาการเกษตร  
ผู้อำนวยการ  
ผู้ควบคุมการวิจัยและเตือนภัยมลพิษโรงงาน  
บริษัทราชเทวีเคมีภัณฑ์ จำกัด

กองวิจัยและเตือนภัยมลพิษโรงงาน

กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษและทะเบียนห้องปฏิบัติการ

โทร. ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๐๓-๕

โทรสาร ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๔๙

ไปรษณีย์อิเล็กทรอนิกส์ saraban@diw.mail.go.th

**UAE**  
UNITED ANALYST AND ENGINEERING  
CONSULTANT COMPANY LIMITED

**UAE**  
UAE



“อุตสาหกรรมก้าวไกล ประเทศไทยก้าวหน้า ร่วมกันพัฒนา อุตสาหกรรมสีเขียว”



ที่ อก ๐๓๑๐(๑)/ ๘ ๓ ๐ ๒

กรมโรงงานอุตสาหกรรม  
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท  
เขตราชเทวี กรุงเทพฯ ๑๐๔๐๐

๐ ๘ ตุลาคม ๒๕๖๔

เรื่อง ยกเลิกบุคลากรของห้องปฏิบัติการวิเคราะห์

เรียน กรรมการผู้จัดการ บริษัท ยูไนเต็ด แอนาไลสต์ แอนด์ เอ็นจิเนียริง คอนซัลแตนท์ จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกชน  
ลงวันที่ ๒๕ กันยายน ๒๕๖๔

ตามคำขอที่อ้างถึง บริษัท ยูไนเต็ด แอนาไลสต์ แอนด์ เอ็นจิเนียริง คอนซัลแตนท์ จำกัด  
ห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ๖-๑๔๕ สถานที่ตั้งเลขที่ ๓ ซอยอุดมสุข ๔๑ ถนนสุขุมวิท  
แขวงบางจาก เขตพระโขนง กรุงเทพมหานคร ขอยกเลิกบุคลากร ความละเอียดแจ้งแล้ว นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้อยกเลิกเจ้าหน้าที่ห้องปฏิบัติการวิเคราะห์เอกชน  
จำนวน ๓ ราย ได้แก่

ทะเบียนเลขที่ ๖-๑๔  
ทะเบียนเลขที่ ๖-๑๔  
ทะเบียนเลขที่ ๖-๑๔

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

ผู้อำนวยการวิจัยและเตือนภัยมลพิษโรงงาน  
บริษัทราชเทวีเคมีภัณฑ์ จำกัด

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กองวิจัยและเตือนภัยมลพิษโรงงาน

กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษและทะเบียนห้องปฏิบัติการ

โทร. ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๐๓-๕

โทรสาร ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๔๙

ไปรษณีย์อิเล็กทรอนิกส์ saraban@diw.mail.go.th



“อุตสาหกรรมก้าวไกล ประเทศไทยก้าวหน้า ร่วมกันพัฒนา อุตสาหกรรมสีเขียว”



**UAE**  
UAE

เอกสารแนบท้ายหนังสือเปลี่ยนแปลงบุคลากรและสารมลพิษที่วิเคราะห์  
บริษัท ยูไนเต็ด แอนนาลิสต์ แอนด์ เอ็นจิเนียริง คอนซัลแตนท์ จำกัด เลขทะเบียน ๖-๑๔๕  
ที่ อก ๐๓๑๐(๑)/ ๕๖ ๙ ๑ ลงวันที่ ๐๗ กรกฎาคม ๒๕๖๔

ขอบข่ายสารมลพิษที่ได้รับขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๑๑ รายการ

| น้ำใต้ดิน จำนวน 4 รายการ |            | วิธีวิเคราะห์                                                                                                                               |
|--------------------------|------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| ลำดับที่                 | สารมลพิษ   |                                                                                                                                             |
| 1                        | Aluminum   | Digestion, Inductively Coupled Plasma Method <sup>(1)</sup>                                                                                 |
| 2                        | Copper     | 1) Digestion, Flame Atomic Absorption Spectrometric Method <sup>(1)</sup><br>2) Digestion, Inductively Coupled Plasma Method <sup>(1)</sup> |
| 3                        | Iron       | 1) Digestion, Flame Atomic Absorption Spectrometric Method <sup>(1)</sup><br>2) Digestion, Inductively Coupled Plasma Method <sup>(1)</sup> |
| 4                        | Molybdenum | Digestion, Inductively Coupled Plasma Method <sup>(1)</sup>                                                                                 |

| อากาศเสีย (ปล่องระบาย) จำนวน 1 รายการ |                    | วิธีวิเคราะห์                                                  |
|---------------------------------------|--------------------|----------------------------------------------------------------|
| ลำดับที่                              | สารมลพิษ           |                                                                |
| 1                                     | Oxides of Nitrogen | Absorption Sampling, Ion Chromatographic Method <sup>(2)</sup> |

| ดิน จำนวน 6 รายการ |                                       | วิธีวิเคราะห์                                                                                                                                   |
|--------------------|---------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| ลำดับที่           | สารมลพิษ                              |                                                                                                                                                 |
| 1                  | Aluminum                              | Digestion, Inductively Coupled Plasma Method <sup>(3,5)</sup>                                                                                   |
| 2                  | Copper                                | 1) Digestion, Flame Atomic Absorption Spectrometric Method <sup>(3,6)</sup><br>2) Digestion, Inductively Coupled Plasma Method <sup>(3,5)</sup> |
| 3                  | Iron                                  | 1) Digestion, Flame Atomic Absorption Spectrometric Method <sup>(3,6)</sup><br>2) Digestion, Inductively Coupled Plasma Method <sup>(3,5)</sup> |
| 4                  | Molybdenum                            | Digestion, Inductively Coupled Plasma Method <sup>(3,5)</sup>                                                                                   |
| 5                  | pH                                    | Electrometric Method <sup>(8)</sup>                                                                                                             |
| 6                  | TPH (C <sub>5</sub> -C <sub>8</sub> ) | Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method <sup>(4,7)</sup>                                                           |

เอกสารอ้างอิง  
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3. United States...



ที่ อก ๐๓๑๐(๑)/ ๕๖ ๙ ๑

กรมโรงงานอุตสาหกรรม  
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท  
เขตราชเทวี กรุงเทพฯ ๑๐๔๐๐

## ๐ ๗ กรกฎาคม ๒๕๖๔

เรื่อง เปลี่ยนแปลงบุคลากรและสารมลพิษที่วิเคราะห์

เรียน กรรมการผู้จัดการ บริษัท ยูไนเต็ด แอนนาลิสต์ แอนด์ เอ็นจิเนียริง คอนซัลแตนท์ จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกชน

ลงวันที่ ๙ พฤษภาคม ๒๕๖๔

สิ่งที่ส่งมาด้วย เอกสารแนบท้ายหนังสือเปลี่ยนแปลงบุคลากรและสารมลพิษที่วิเคราะห์

บริษัท ยูไนเต็ด แอนนาลิสต์ แอนด์ เอ็นจิเนียริง คอนซัลแตนท์ จำกัด จำนวน ๒ แผ่น

ตามหนังสือที่อ้างถึง บริษัท ยูไนเต็ด แอนนาลิสต์ แอนด์ เอ็นจิเนียริง คอนซัลแตนท์ จำกัด

ห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ๖-๑๔๕ สถานที่ตั้งเลขที่ ๓ ซอยอุดมสุข ๔๑ ถนนสุขุมวิท

แขวงบางจาก เขตพระโขนง กรุงเทพมหานคร ขอเปลี่ยนแปลงบุคลากรและสารมลพิษที่วิเคราะห์

ความละเอียดแล้ว

นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว มีความเห็นดังนี้

๑. ให้ยกเลิกเจ้าหน้าที่ห้องปฏิบัติการวิเคราะห์เอกชน จำนวน ๓ ราย

ทะเบียนเลขที่ ๖-๑๔๕

ทะเบียนเลขที่ ๖-๑๔๕

ทะเบียนเลขที่ ๖-๑๔๕

ทะเบียนเลขที่ ๖-๑๔๕

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ทะเบียนเลขที่ ๖-๑๔๕

ทะเบียนเลขที่ ๖-๑๔๕

ผู้ชำนาญการวิจัยและเฝ้าระวังมลพิษโรงงาน  
ปฏิบัติการตามแผนปฏิบัติการโรงงานอุตสาหกรรม

กองวิจัยและเฝ้าระวังมลพิษโรงงาน

กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษและทะเบียนห้องปฏิบัติการ

โทร. ๐ ๒๕๓๐ ๖๓๑๒ ต่อ ๒๑๐๓-๕

โทรสาร ๐ ๒๕๓๐ ๖๓๑๒ ต่อ ๒๑๔๔

ไปรษณีย์อิเล็กทรอนิกส์ saraban@dw.mail.go.th



"อุตสาหกรรมก้าวหน้า ประเทศไทยก้าวหน้า ร่วมกันพัฒนา อุตสาหกรรมสีเขียว"



ด้านถูกต้อง



UNITED ANALYST AND ENGINEERING  
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ขอแสดงความนับถือ

จึงเรียนมาเพื่อทราบ

อนึ่ง หนังสือฉบับนี้จะหมดอายุพร้อมหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

ในวันที่ ๒ กุมภาพันธ์ ๒๕๖๒

๒. ให้เพิ่มผู้ควบคุมห้องปฏิบัติการวิเคราะห์เอกชน จำนวน ๑ ราย

ทะเบียนเลขที่ ๖-๑๔๕

ทะเบียนเลขที่ ๖-๑๔๕

ทะเบียนเลขที่ ๖-๑๔๕

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ทะเบียนเลขที่ ๖-๑๔๕



ที่ อก ๐๓๐๑(๑)/ ๑ ๔ ๙ ๑

กรมโรงงานอุตสาหกรรม

ถนนพระรามที่ ๖ แขวงทุ่งพญาไท  
เขตราชเทวี กรุงเทพฯ ๑๐๔๐๐

๒๔ กุมภาพันธ์ ๒๕๖๔

เรื่อง ยกเลิกบุคลากรของห้องปฏิบัติการวิเคราะห์

เรียน กรรมการผู้จัดการ บริษัท ยูนิค แอนาไลติกส์ แอนด์ เอ็นจิเนียริง คอนซัลแตนท์ จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ด้อยอายุ/เปลี่ยนแปลงบุคลากร และชนิดสารเคมีของห้องปฏิบัติการวิเคราะห์เอกชน  
ลงวันที่ ๑๘ กุมภาพันธ์ ๒๕๖๔

ตามคำขอที่อ้างถึง บริษัท ยูนิค แอนาไลติกส์ แอนด์ เอ็นจิเนียริง คอนซัลแตนท์ จำกัด  
ห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ๖-๑๔๕ สถานที่ตั้งเลขที่ ๓ ซอยอุดมสุข ๔๑ ถนนสุขุมวิท  
แขวงบางจาก เขตพระโขนง กรุงเทพมหานคร ขอยกเลิกบุคลากร ความละเอียดแจ้งแล้ว นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้ยกเลิกเจ้าหน้าที่ห้องปฏิบัติการวิเคราะห์เอกชน  
จำนวน ๓ ราย ได้แก่

ทะเบียนเลขที่ ๖-๑๔  
ทะเบียนเลขที่ ๖-๑๔  
ทะเบียนเลขที่ ๖-๑๔

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

รองอธิบดี ปฏิบัติราชการแทน  
อธิบดีกรมโรงงานอุตสาหกรรม

กองวิจัยและพัฒนามลพิษโรงงาน

กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษและทะเบียนห้องปฏิบัติการ

โทร. ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๐๓-๕

โทรสาร ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๔๙

ไปรษณีย์อิเล็กทรอนิกส์ saraban@dlw.mail.go.th

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Handwritten signature: *[Signature]*

เรื่อง ต่อยทุนหนังสือพิมพ์ขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน  
 O๗ กุมภาพันธ์ ๒๕๖๕  
 กรมการผู้จัดการ บริษัท ยูไนเต็ด แอนาไลส์ คอมพิวเตอร์ จำกัด  
 คำขอขึ้นทะเบียนบอขาย/เปลี่ยนแปลงบุคลากร และขนิสรมลพิษของห้องปฏิบัติการวิเคราะห์เอกชน  
 ลงวันที่ ๓ ธันวาคม ๒๕๖๓

๑. รายชื่อผู้ควบคุมห้องปฏิบัติการวิเคราะห์เอกชน จำนวน ๔๐ ราย
๒. รายชื่อเจ้าหน้าที่ห้องปฏิบัติการวิเคราะห์เอกชน จำนวน ๑๔๑ ราย
๓. ข้อบ่งชี้สามารถผลิตที่ได้รับขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม

ตามคำขอที่ยังมี บริษัท ยูนิค แอมบลิสดี แอนด์ เอ็นจิเนียริ่ง คอมพิวเตอร์ จำกัด ขออภัย  
 ไม่สามารถดำเนินการได้เนื่องจาก บริษัท ยูนิค แอมบลิสดี แอนด์ เอ็นจิเนียริ่ง คอมพิวเตอร์ จำกัด ขออภัย  
 ไม่สามารถดำเนินการได้เนื่องจาก บริษัท ยูนิค แอมบลิสดี แอนด์ เอ็นจิเนียริ่ง คอมพิวเตอร์ จำกัด ขออภัย

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้บริษัท ยูไนเต็ด แอนนาลิสต์ แอนด์ เอ็นจิเนียริง  
คอนซัลแตนท์ จำกัด ต่อยอดหนี้สินที่ขึ้นทะเบียนปฏิบัติการวิเคราะห์เอกชน โดยมีองค์ประกอบดังนี้

ก. ผู้ควบคุมห้องปฏิบัติการวิเคราะห์เอกชน จำนวน ๔๐ ราย ตามสิ่งที่ส่งมาด้วย ๑

ข. เจ้าหน้าที่ห้องปฏิบัติการวิเคราะห์เอกชน จำนวน ๑๔๑ ราย ตามสิ่งที่ส่งมาด้วย ๒

ค. ขอบข่ายสามารถพิพจน์ที่ได้รับชำระเบี้ยนไหวเคราะห์ในมา/น่าย น้าได้ดิน อากาศเสีย  
งปฏิภนหรือลุดที่ไม้นี้แล้ว และดิน ตามสิ่งส่งมาด้วย ๓

หนังสือฉบับนี้จะมีผลภายในวันที่ ๒ กุมภาพันธ์ ๒๕๒๒ หากประสงค์ต่ออายุหนังสือขึ้นทะเบียนต้องปฏิบัติตามวิธีการที่ระบืออาทอน ในนี้คำขอต่ออายุพร้อมเอกสารประกอบคำขอต่อกรมโรงงานอุตสาหกรรมภายใน ๖๐ วัน ก่อนวันเลิอาอายุขอหนังสือขึ้นทะเบียนต้องปฏิบัติตามวิธีการที่ระบืออาทอน

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

งานวิจัยและเตือนภัยมลพิษโรงงาน  
ในนามมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษและพิษของห้องปฏิบัติการ LIMITED

รองอธิบดี ปฏิบัติราชการแทน  
อธิบดีกรมสิ่งแวดล้อม

UNITO ANALYST AND ENGINEERING  
จำกัด

ด้านกฎหมาย

ร. ๐ ๒๕๓๐ บ๓๑๖ ตย ๒๑๐๓-๕

นาย (๓๖)

เอกสารแนบท้ายหนังสือต่ออายุรับขันทะเบียนท้องถิ่นการวิเคราะห์เอกชน

ข. เจ้าหน้าที่ห้องปฏิบัติการวิเคราะห์เอกชน จำนวน ๑๔๑ ราย

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(1987) N.

**ZZA** **อะไหล่**  
 วิศวกรวิเคราะห์และประเมินผล  
 วิศวกรวิเคราะห์และประเมินผล  
 วิศวกรวิเคราะห์และประเมินผล

11. (20)



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## น้ำใต้ดิน จำนวน 126 รายการ

| ลำดับ | สารมลพิษ             | วิธีวิเคราะห์                                                                                                                                                       |
|-------|----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1     | Acenaphthene         | 1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(a)</sup><br>2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(a)</sup> |
| 2     | Acetone              | Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>(a)</sup>                                                                                         |
| 3     | Aldrin               | 1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(a)</sup><br>2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(a)</sup> |
| 4     | Anthracene           | 1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(a)</sup><br>2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(a)</sup> |
| 5     | Antimony             | Digestion, Inductively Coupled Plasma Method <sup>(a)</sup>                                                                                                         |
| 6     | Arsenic              | 1) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method <sup>(a)</sup><br>2) Digestion, Inductively Coupled Plasma Method <sup>(a)</sup>            |
| 7     | Atrazine             | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(a)</sup>                                                                              |
| 8     | Barium               | Digestion, Inductively Coupled Plasma Method <sup>(a)</sup>                                                                                                         |
| 9     | Benz(a)anthracene    | 1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(a)</sup><br>2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(a)</sup> |
| 10    | Benzene              | Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>(a)</sup>                                                                                         |
| 11    | Benzo(b)fluoranthene | 1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(a)</sup><br>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><br>2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(a)</sup> |
| 13    | Benzoic acid         | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(a)</sup>                                                                              |

14 Benzo(a)pyrene...

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| ลำดับ | สารมลพิษ                | วิธีวิเคราะห์                                                                                                                                                                                        |
|-------|-------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 25    | Endrin aldehyde         | Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(a)</sup>                                                                                                                                  |
| 26    | Formaldehyde            | Distillation, Colorimetric Method <sup>(2)</sup>                                                                                                                                                     |
| 27    | Free Chlorine           | 1) Iodometric Method <sup>(a)</sup><br>2) DPD Ferrous Titrimetric Method <sup>(a)</sup>                                                                                                              |
| 28    | Heptachlor              | Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(a)</sup>                                                                                                                                  |
| 29    | Heptachlor Epoxide      | Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(a)</sup>                                                                                                                                  |
| 30    | Hexavalent Chromium     | Colorimetric Method <sup>(a)</sup>                                                                                                                                                                   |
| 31    | Lead                    | 1) Digestion, Direct Air-Acetylene Flame Method <sup>(a)</sup><br>2) Digestion, Inductively Coupled Plasma Method <sup>(a)</sup>                                                                     |
| 32    | Manganese               | 1) Digestion, Direct Air-Acetylene Flame Method <sup>(a)</sup><br>2) Digestion, Inductively Coupled Plasma Method <sup>(a)</sup>                                                                     |
| 33    | Mercury                 | Digestion, Cold-Vapor Atomic Absorption Spectrometric Method <sup>(a)</sup>                                                                                                                          |
| 34    | Methoxychlor            | Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(a)</sup>                                                                                                                                  |
| 35    | Nickel                  | 1) Digestion, Direct Air-Acetylene Flame Method <sup>(a)</sup><br>2) Digestion, Inductively Coupled Plasma Method <sup>(a)</sup>                                                                     |
| 36    | Oil & Grease            | 1) Liquid-Liquid, Partition-Gravimetric Method <sup>(a)</sup><br>2) Soxhlet Extraction Method <sup>(a)</sup>                                                                                         |
| 37    | pH                      | Electrometric Method <sup>(a)</sup>                                                                                                                                                                  |
| 38    | Phenols                 | 1) Distillation, Chloroform Extraction Method <sup>(a)</sup><br>2) Distillation, Direct Photometric Method <sup>(a)</sup>                                                                            |
| 39    | Selenium                | 1) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method <sup>(a)</sup><br>2) Digestion, Inductively Coupled Plasma Method <sup>(a)</sup>                                             |
| 40    | Sulfide                 | 1) Iodometric Method <sup>(a)</sup><br>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 from 103 to 105 °C <sup>(a)</sup>                                                                                                                                                              |
| 45    | Trivalent Chromium      | 1) Digestion, Direct Air-Acetylene Flame Method, Colorimetric Method, Calculation <sup>(a)</sup><br>2) Digestion, Inductively Coupled Plasma Method, Colorimetric Method, Calculation <sup>(a)</sup> |
| 46    | Zinc                    | 1) Digestion, Direct Air-Acetylene Flame Method <sup>(a)</sup><br>2) Digestion, Inductively Coupled Plasma Method <sup>(a)</sup>                                                                     |

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| ลำดับ | สารเคมี               | วิธีวิเคราะห์                                                                                                                                                                                        |
|-------|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 29    | Chlorobenzene         | Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>(a)</sup>                                                                                                                          |
| 30    | Chlorodibromomethane  | Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>(a)</sup>                                                                                                                          |
| 31    | Chloroform            | Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>(a)</sup>                                                                                                                          |
| 32    | 2-Chlorophenol        | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(a)</sup>                                                                                                               |
| 33    | Chromium              | 1) Digestion, Direct Air-Acetylene Flame Method <sup>(a)</sup><br>2) Digestion, Inductively Coupled Plasma Method <sup>(a)</sup>                                                                     |
| 34    | Chromium (III)        | 1) Digestion, Direct Air-Acetylene Flame Method; Colorimetric Method; Calculation <sup>(a)</sup><br>2) Digestion, Inductively Coupled Plasma Method; Colorimetric Method; Calculation <sup>(a)</sup> |
| 35    | Chromium (VI)         | Colorimetric Method <sup>(a)</sup>                                                                                                                                                                   |
| 36    | Chrysene              | 1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(a)</sup><br>2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(a)</sup>                                  |
| 37    | Cyanide               | Distillation, Colorimetric Method <sup>(a)</sup>                                                                                                                                                     |
| 38    | 2,4-D                 | Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(a)</sup>                                                                                                                                  |
| 39    | DDD                   | 1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(a)</sup><br>2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(a)</sup>                                  |
| 40    | DDE                   | 1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(a)</sup><br>2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(a)</sup>                                  |
| 41    | DDT                   | 1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(a)</sup><br>2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(a)</sup>                                  |
| 42    | Dibenz(a,h)anthracene | 1) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(a)</sup><br>2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(a)</sup>               |

43 Di-n-butyl phthalate...

| ลำดับ | สารเคมี                    | วิธีวิเคราะห์                                                                                                                                                                          |
|-------|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 14    | Benzo(a)pyrene             | 1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(a)</sup><br>2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(a)</sup>                    |
| 15    | Benzo(g,h,i)perylene       | 1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(a)</sup><br>2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(a)</sup>                    |
| 16    | Beryllium                  | Digestion, Inductively Coupled Plasma Method <sup>(a)</sup>                                                                                                                            |
| 17    | Bis(2-chloroethyl)ether    | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(a)</sup>                                                                                                 |
| 18    | Bis(2-ethylhexyl)phthalate | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(a)</sup>                                                                                                 |
| 19    | Bromodichloromethane       | Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>(a)</sup>                                                                                                            |
| 20    | Bromoform                  | Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>(a)</sup>                                                                                                            |
| 21    | Butanol                    | Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>(a)</sup>                                                                                                            |
| 22    | Butyl benzyl phthalate     | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(a)</sup>                                                                                                 |
| 23    | Cadmium                    | 1) Digestion, Direct Air-Acetylene Flame Method <sup>(a)</sup><br>2) Digestion, Electrothermal Atomic Absorption Spectrometric Method <sup>(a)</sup>                                   |
| 24    | Carbazole                  | 3) Digestion, Inductively Coupled Plasma Method <sup>(a)</sup><br>Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(a)</sup>                               |
| 25    | Carbon disulfide           | Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>(a)</sup>                                                                                                            |
| 26    | Carbon tetrachloride       | Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>(a)</sup>                                                                                                            |
| 27    | Chlordane                  | 1) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(a)</sup><br>2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(a)</sup> |
| 28    | p-Chloroaniline            | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(a)</sup>                                                                                                 |

29 Chlorobenzene...

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| ลำดับ | สารเคมีพิษ               | วิธีวิเคราะห์                                                                                                                                                       |
|-------|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 61    | 2,4-Dinitrotoluene       | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(4)</sup>                                                                              |
| 62    | 2,6-Dinitrotoluene       | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(4)</sup>                                                                              |
| 63    | Di-n-Octyl phthalate     | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(4)</sup>                                                                              |
| 64    | Endosulfan               | 1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(4)</sup><br>2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(4)</sup> |
| 65    | Endrin                   | 1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(4)</sup><br>2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(4)</sup> |
| 66    | Ethylbenzene             | Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>(4)</sup>                                                                                         |
| 67    | Fluoranthene             | 1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(4)</sup><br>2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(4)</sup> |
| 68    | Fluorene                 | 1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(4)</sup><br>2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(4)</sup> |
| 69    | Heptachlor               | 1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(4)</sup><br>2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(4)</sup> |
| 70    | Heptachlor epoxide       | 1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(4)</sup><br>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  $\alpha$ -HCH...

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| ลำดับ | สารเคมีพิษ                 | วิธีวิเคราะห์                                                                                                                                                       |
|-------|----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 43    | Di-n-butyl phthalate       | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(4)</sup>                                                                              |
| 44    | 1,2-Dichlorobenzene        | Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>(4)</sup>                                                                                         |
| 45    | 1,3-Dichlorobenzene        | Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>(4)</sup>                                                                                         |
| 46    | 1,4-Dichlorobenzene        | Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>(4)</sup>                                                                                         |
| 47    | 3,3'-Dichlorobenzidine     | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(4)</sup>                                                                              |
| 48    | 1,1-Dichloroethane         | Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>(4)</sup>                                                                                         |
| 49    | 1,2-Dichloroethane         | Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>(4)</sup>                                                                                         |
| 50    | 1,1-Dichloroethylene       | Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>(4)</sup>                                                                                         |
| 51    | cis-1,2-Dichloroethylene   | Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>(4)</sup>                                                                                         |
| 52    | trans-1,2-Dichloroethylene | Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>(4)</sup>                                                                                         |
| 53    | 2,4-Dichlorophenol         | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(4)</sup>                                                                              |
| 54    | 1,2-Dichloropropane        | Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>(4)</sup>                                                                                         |
| 55    | 1,3-Dichloropropane        | Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>(4)</sup>                                                                                         |
| 56    | 1,3-Dichloropropene        | Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>(4)</sup>                                                                                         |
| 57    | Dieldrin                   | 1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(4)</sup><br>2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(4)</sup> |
| 58    | Diethyl phthalate          | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(4)</sup>                                                                              |
| 59    | 2,4-Dimethylphenol         | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(4)</sup>                                                                              |
| 60    | 2,4-Dinitrophenol          | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(4)</sup>                                                                              |

61 2,4-Dinitrotoluene...

| ลำดับ | สารเคมี                                                                                                                     | วิธีวิเคราะห์                                                                                                                                                       |
|-------|-----------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 87    | Methylene chloride                                                                                                          | Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>(a)</sup>                                                                                         |
| 88    | 2-Methylphenol                                                                                                              | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(a)</sup>                                                                              |
| 89    | 2-Methylnaphthalene                                                                                                         | 1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(a)</sup><br>2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(a)</sup> |
| 90    | Methyl tert-butyl ether                                                                                                     | Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>(a)</sup>                                                                                         |
| 91    | Naphthalene                                                                                                                 | 1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(a)</sup><br>2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(a)</sup> |
| 92    | Nickel                                                                                                                      | 1) Digestion, Direct Air-Acetylene Flame Method <sup>(a)</sup><br>2) Digestion, Inductively Coupled Plasma Method <sup>(a)</sup>                                    |
| 93    | Nitrobenzene                                                                                                                | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(a)</sup>                                                                              |
| 94    | N-Nitrosodiphenylamine                                                                                                      | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(a)</sup>                                                                              |
| 95    | N-Nitrosodi-n-propylamine                                                                                                   | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(a)</sup>                                                                              |
| 96    | Polychlorinated Biphenyls<br>- PCB 1016<br>- PCB 1221<br>- PCB 1232<br>- PCB-1242<br>- PCB-1248<br>- PCB-1254<br>- PCB-1260 | 1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(a)</sup><br>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><br>2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(a)</sup> |

| ลำดับ | สารเคมี                   | วิธีวิเคราะห์                                                                                                                                                                                      |
|-------|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 74    | α-HCH                     | 1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(a)</sup><br>2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(a)</sup>                                |
| 75    | β-HCH                     | 1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(a)</sup><br>2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(a)</sup>                                |
| 76    | γ-HCH                     | 1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(a)</sup><br>2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(a)</sup>                                |
| 77    | Hexachlorocyclopentadiene | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(a)</sup>                                                                                                             |
| 78    | Hexachloroethane          | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(a)</sup>                                                                                                             |
| 79    | Indeno(1,2,3-cd)pyrene    | 1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(a)</sup><br>2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(a)</sup>                                |
| 80    | Isophorone                | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(a)</sup>                                                                                                             |
| 81    | Lead                      | 1) Digestion, Direct Air-Acetylene Flame Method <sup>(a)</sup><br>2) Digestion, Electrothermal Atomic Absorption Spectrometric Method <sup>(a)</sup>                                               |
| 82    | Manganese                 | 3) Digestion, Inductively Coupled Plasma Method <sup>(a)</sup><br>1) Digestion, Direct Air-Acetylene Flame Method <sup>(a)</sup><br>2) Digestion, Inductively Coupled Plasma Method <sup>(a)</sup> |
| 83    | Mercury                   | Digestion, Cold-Vapor Atomic Absorption Spectrometric Method <sup>(a)</sup>                                                                                                                        |
| 84    | Methanol                  | Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>(a)</sup>                                                                                                                        |
| 85    | Methoxychlor              | 1) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(a)</sup><br>2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(a)</sup>             |
| 86    | Methyl bromide            | Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>(a)</sup>                                                                                                                        |

| ลำดับ | สารมลพิษ               | วิธีวิเคราะห์                                                                                                                    |
|-------|------------------------|----------------------------------------------------------------------------------------------------------------------------------|
| 116   | 2,4,5-Trichlorophenol  | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(4)</sup>                                           |
| 117   | 2,4,6-Trichlorophenol  | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(4)</sup>                                           |
| 118   | 1,3,5-Trimethylbenzene | Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>(4)</sup>                                                      |
| 119   | Vanadium               | Digestion, Inductively Coupled Plasma Method <sup>(4)</sup>                                                                      |
| 120   | Vinyl acetate          | Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>(4)</sup>                                                      |
| 121   | Vinyl chloride         | Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>(4)</sup>                                                      |
| 122   | m-Xylene               | Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>(4)</sup>                                                      |
| 123   | o-Xylene               | Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>(4)</sup>                                                      |
| 124   | p-Xylene               | Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>(4)</sup>                                                      |
| 125   | Xylene (Total)         | Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>(4)</sup>                                                      |
| 126   | Zinc                   | 1) Digestion, Direct Air-Acetylene Flame Method <sup>(4)</sup><br>2) Digestion, Inductively Coupled Plasma Method <sup>(4)</sup> |

อากาศเสีย (ปล่อยระบาย) 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><br>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><br>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>                                                                                                                |

Chromium (ต่อ)...

| ลำดับ | สารมลพิษ                                 | วิธีวิเคราะห์                                                                                                                                                       |
|-------|------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 100   | Phenol                                   | 1) Distillation, Chloroform Extraction Method <sup>(4)</sup><br>2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(4)</sup>           |
| 101   | Pyrene                                   | 1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(4)</sup><br>2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(4)</sup> |
| 102   | Selenium                                 | 1) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method <sup>(4)</sup><br>2) Digestion, Inductively Coupled Plasma Method <sup>(4)</sup>            |
| 103   | Silver                                   | Digestion, Inductively Coupled Plasma Method <sup>(4)</sup>                                                                                                         |
| 104   | Styrene                                  | Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>(4)</sup>                                                                                         |
| 105   | 1,1,2,2-Tetrachloroethane                | Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>(4)</sup>                                                                                         |
| 106   | Tetrachloroethylene                      | Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>(4)</sup>                                                                                         |
| 107   | Toluene                                  | Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>(4)</sup>                                                                                         |
| 108   | Toxaphene                                | 1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(4)</sup><br>2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(4)</sup> |
| 109   | TPH (C <sub>5</sub> - C <sub>9</sub> )   | 1) Purge and Trap, Gas Chromatographic Method <sup>(12,22)</sup><br>2) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(12,22)</sup>             |
| 110   | TPH (C <sub>8</sub> - C <sub>16</sub> )  | Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(9,22)</sup>                                                                            |
| 111   | TPH (C <sub>16</sub> - C <sub>35</sub> ) | Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(9,22)</sup>                                                                            |
| 112   | 1,2,4-Trichlorobenzene                   | Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>(4)</sup>                                                                                         |
| 113   | 1,1,1-Trichloroethane                    | Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>(4)</sup>                                                                                         |
| 114   | 1,1,2-Trichloroethane                    | Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>(4)</sup>                                                                                         |
| 115   | Trichloroethylene                        | Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>(4)</sup>                                                                                         |

116 2,4,5-Trichlorophenol...

| ลำดับ | สารเคมี                     | วิธีวิเคราะห์                                                                                                                   |
|-------|-----------------------------|---------------------------------------------------------------------------------------------------------------------------------|
| 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><br>2) Adsorption Sampling, Gas Chromatographic Method <sup>[5]</sup> |

สิ่งปฏิกูลหรือวัสดุที่ไม่ใช้แล้ว จำนวน 35 รายการ

| ลำดับ | สารเคมี   | วิธีวิเคราะห์                                                                                                                                                                                                                                                                                                                                   |
|-------|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1     | Aldrin    | 1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[3,9,23]</sup><br>2) Ultrasonic Extraction, Gas Chromatographic Method <sup>[10,23]</sup>                                                                                                                                                      |
| 2     | Antimony  | 1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[3,6,14]</sup><br>2) Digestion, Inductively Coupled Plasma Method <sup>[7,14]</sup>                                                                                                                                                                                      |
| 3     | Arsenic   | 1) Waste Extraction, Digestion, Hydride Generation/Atomic Absorption Spectrometric Method <sup>[3,6,16]</sup><br>2) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[3,6,14]</sup><br>3) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method <sup>[7,16]</sup>                                             |
| 4     | Barium    | 4) Digestion, Inductively Coupled Plasma Method <sup>[7,14]</sup><br>1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[3,6,14]</sup>                                                                                                                                                                                      |
| 5     | Beryllium | 2) Digestion, Inductively Coupled Plasma Method <sup>[7,14]</sup><br>1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[3,6,14]</sup>                                                                                                                                                                                      |
| 6     | Cadmium   | 2) Digestion, Inductively Coupled Plasma Method <sup>[7,14]</sup><br>1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method <sup>[3,6,15]</sup><br>2) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[3,6,14]</sup>                                                                                  |
| 7     | Chlordane | 3) Digestion, Flame Atomic Absorption Spectrometric Method <sup>[7,15]</sup><br>4) Digestion, Inductively Coupled Plasma Method <sup>[7,14]</sup><br>1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[3,9,23]</sup><br>2) Ultrasonic Extraction, Gas Chromatographic Method <sup>[10,23]</sup> |

8 Chromium...

| ลำดับ | สารเคมี            | วิธีวิเคราะห์                                                                                                                                                                                      |
|-------|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 6     | Chromium (๑๖)      | 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><br>2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method <sup>[5]</sup>                         |
| 9     | Cresol             | Absorption Sampling, Gas Chromatographic Method <sup>[5]</sup>                                                                                                                                     |
| 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><br>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><br>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><br>2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method <sup>[5]</sup>                         |
| 18    | Opacity            | Ringelmann's Method <sup>[11]</sup>                                                                                                                                                                |
| 19    | Oxides of Nitrogen | 1) Absorption Sampling, Phenoldisulfonic acid Method <sup>[5]</sup><br>2) Instrumental Analyzer Method <sup>[5]</sup>                                                                              |
| 20    | Selenium           | 1) Isokinetic Sampling, Digestion, Hydride Generation/Atomic Absorption Spectrometric Method <sup>[5]</sup><br>2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method <sup>[5]</sup> |
| 21    | Sulfur Dioxide     | 1) Absorption Sampling, Barium-Thorium Titrimetric Method <sup>[5]</sup>                                                                                                                           |
| 22    | Sulfuric Acid      | 2) Instrumental Analyzer Method <sup>[5]</sup><br>Isokinetic Sampling, Barium-Thorium Titrimetric Method <sup>[5]</sup>                                                                            |

23 Total Suspended Particulate...

| ลำดับ | สารเคมี    | วิธีวิเคราะห์                                                                                                                                                                                                                                                                                                                                        |
|-------|------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 15    | DDE        | 1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(3.9.23)</sup><br>2) Ultrasonic Extraction, Gas Chromatographic Method <sup>(10.23)</sup>                                                                                                                                                           |
| 16    | DDT        | 1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(3.9.23)</sup><br>2) Ultrasonic Extraction, Gas Chromatographic Method <sup>(10.23)</sup>                                                                                                                                                           |
| 17    | Dieldrin   | 1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(3.9.23)</sup><br>2) Ultrasonic Extraction, Gas Chromatographic Method <sup>(10.23)</sup>                                                                                                                                                           |
| 18    | Endrin     | 1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(3.9.23)</sup><br>2) Ultrasonic Extraction, Gas Chromatographic Method <sup>(10.23)</sup>                                                                                                                                                           |
| 19    | Heptachlor | 1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(3.9.23)</sup><br>2) Ultrasonic Extraction, Gas Chromatographic Method <sup>(10.23)</sup>                                                                                                                                                           |
| 20    | Lead       | 1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method <sup>(3.6.15)</sup><br>2) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>(3.6.14)</sup><br>3) Digestion, Flame Atomic Absorption Spectrometric Method <sup>(7.15)</sup><br>4) Digestion, Inductively Coupled Plasma Method <sup>(7.14)</sup>       |
| 21    | Lindane    | 1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(3.9.23)</sup><br>2) Ultrasonic Extraction, Gas Chromatographic Method <sup>(10.23)</sup>                                                                                                                                                           |
| 22    | Mercury    | 1) Waste Extraction, Digestion, Cold-Vapor Atomic Absorption Spectrometric Method <sup>(3.19)</sup><br>2) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>(3.6.14)</sup><br>3) Digestion, Cold-Vapor Atomic Absorption Spectrometric Method <sup>(19)</sup><br>4) Digestion, Inductively Coupled Plasma Method <sup>(7.14)</sup> |

Mercury (ค่า)... 15 DDE...

| ลำดับ | สารเคมี        | วิธีวิเคราะห์                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-------|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 8     | Chromium       | 1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method <sup>(3.6.15)</sup><br>2) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>(3.6.14)</sup><br>3) Digestion, Flame Atomic Absorption Spectrometric Method <sup>(7.15)</sup><br>4) Digestion, Inductively Coupled Plasma Method <sup>(7.14)</sup>                                                                                                                                                                                                                                 |
| 9     | Chromium (III) | 1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method; Waste Extraction, Colorimetric Method; Calculation <sup>(3.6.15,17)</sup><br>2) Waste Extraction, Digestion, Inductively Coupled Plasma Method; Waste Extraction, Colorimetric Method; Calculation <sup>(3.6.14,17)</sup><br>3) Digestion, Flame Atomic Absorption Spectrometric Method; Alkaline Digestion, Colorimetric Method; Calculation <sup>(7.15,17)</sup><br>4) Digestion, Inductively Coupled Plasma Method; Alkaline Digestion, Colorimetric Method; Calculation <sup>(7.14,17)</sup> |
| 10    | Chromium (VI)  | 1) Waste Extraction, Colorimetric Method <sup>(3.17)</sup><br>2) Alkaline Digestion, Colorimetric Method <sup>(8.17)</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 11    | Cobalt         | 1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>(3.6.14)</sup><br>2) Digestion, Inductively Coupled Plasma Method <sup>(7.14)</sup>                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 12    | Copper         | 1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method <sup>(3.6.15)</sup><br>2) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>(3.6.14)</sup><br>3) Digestion, Flame Atomic Absorption Spectrometric Method <sup>(7.15)</sup><br>4) Digestion, Inductively Coupled Plasma Method <sup>(7.14)</sup>                                                                                                                                                                                                                                 |
| 13    | 2,4-D          | 1) Waste Extraction, Gas Chromatographic Method <sup>(3.26)</sup><br>2) Ultrasonic Extraction, Gas Chromatographic Method <sup>(10.23)</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| 14    | DDD            | 1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(3.9.23)</sup><br>2) Ultrasonic Extraction, Gas Chromatographic Method <sup>(10.23)</sup>                                                                                                                                                                                                                                                                                                                                                                                     |

15 DDE...

| ลำดับ | สารมลพิษ                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | วิธีวิเคราะห์                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 27    | Polychlorinated Biphenyls(ตอ)<br>- 2,2',3,4,4',5'-<br>Hexachlorobiphenyl<br>- 2,2',3,4,5,5'-<br>Hexachlorobiphenyl<br>- 2,2',3,5,5',6'-<br>Hexachlorobiphenyl<br>- 2,2',4,4',5,5'-<br>Hexachlorobiphenyl<br>- 2,2',3,3',4,4',5'-<br>Heptachlorobiphenyl<br>- 2,2',3,4,4',5,5'-<br>Heptachlorobiphenyl<br>- 2,2',3,4,4',5',6'-<br>Heptachlorobiphenyl<br>- 2,2',3,4',5,5',6'-<br>Heptachlorobiphenyl<br>- 2,2',3,3',4,4',5,5',6'-<br>Nonachlorobiphenyl<br>Pentachlorophenol | 1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(3,9,28)</sup><br>2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup><br>Electrometric Method <sup>(31,32)</sup><br>1) Waste Extraction, Digestion, Hydride Generation/Atomic Absorption Spectrometric Method <sup>(3,6,21)</sup><br>2) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>(3,6,14)</sup><br>3) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method <sup>(7,21)</sup><br>4) Digestion, Inductively Coupled Plasma Method <sup>(7,14)</sup><br>1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>(3,6,14)</sup><br>2) Digestion, Inductively Coupled Plasma Method <sup>(7,14)</sup><br>1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>(3,6,14)</sup><br>2) Digestion, Inductively Coupled Plasma Method <sup>(7,14)</sup> |
| 28    | pH                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 29    | Selenium                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 30    | Silver                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 31    | Thallium                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |

32 Toxaphene...

| ลำดับ | สารมลพิษ                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | วิธีวิเคราะห์                                                                                                                                                                                                                                                                                                                                  |
|-------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 22    | Mercury (ตอ)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 5) Thermal Decomposition Amalgamation and Atomic Absorption Spectrometric Method <sup>(20)</sup>                                                                                                                                                                                                                                               |
| 23    | Methoxychlor                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(3,9,23)</sup><br>2) Ultrasonic Extraction, Gas Chromatographic Method <sup>(10,23)</sup>                                                                                                                                                     |
| 24    | Molybdenum                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>(3,6,14)</sup><br>2) Digestion, Inductively Coupled Plasma Method <sup>(7,14)</sup>                                                                                                                                                                                     |
| 25    | Nickel                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method <sup>(3,6,15)</sup><br>2) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>(3,6,14)</sup><br>3) Digestion, Flame Atomic Absorption Spectrometric Method <sup>(7,15)</sup><br>4) Digestion, Inductively Coupled Plasma Method <sup>(7,14)</sup> |
| 26    | Polychlorinated Biphenyls<br>- Aroclor 1016<br>- Aroclor 1221<br>- Aroclor 1232<br>- Aroclor 1242<br>- Aroclor 1248<br>- Aroclor 1254<br>- Aroclor 1260<br>- 2-Chlorobiphenyl<br>- 2,3-Dichlorobiphenyl<br>- 2,2',5-Trichlorobiphenyl<br>- 2,4',5-Trichlorobiphenyl<br>- 2,2',3,5'-Tetrachlorobiphenyl<br>- 2,2',5,5'-Tetrachlorobiphenyl<br>- 2,3',4,4'-Tetrachlorobiphenyl<br>- 2,2',3,4,5'-<br>Pentachlorobiphenyl<br>- 2,2',4,5,5'-<br>Pentachlorobiphenyl<br>- 2,3,3',4',6'-<br>Pentachlorobiphenyl | 1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(3,9,24)</sup><br>2) Ultrasonic Extraction, Gas Chromatographic Method <sup>(10,24)</sup>                                                                                                                                                     |

| ลำดับ | สารมลพิษ                   | วิธีวิเคราะห์                                                                              |
|-------|----------------------------|--------------------------------------------------------------------------------------------|
| 4     | Anthracene (ตอ)            | 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10.28)</sup> |
| 5     | Antimony                   | Digestion, Inductively Coupled Plasma Method <sup>(7.14)</sup>                             |
| 6     | Arsenic                    | 1) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method <sup>(7.14)</sup>  |
| 7     | Atrazine                   | 2) Digestion, Inductively Coupled Plasma Method <sup>(7.14)</sup>                          |
| 8     | Barium                     | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10.28)</sup>    |
| 9     | Benz(a)anthracene          | Digestion, Inductively Coupled Plasma Method <sup>(7.14)</sup>                             |
| 10    | Benzene                    | 1) Ultrasonic Extraction, Gas Chromatographic Method <sup>(10.25)</sup>                    |
| 11    | Benzo(b)fluoranthene       | 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10.28)</sup> |
| 12    | Benzo(k)fluoranthene       | 1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(13.27)</sup>        |
| 13    | Benzoic acid               | 2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method <sup>(11.27)</sup> |
| 14    | Benzo(a)pyrene             | 1) Ultrasonic Extraction, Gas Chromatographic Method <sup>(10.25)</sup>                    |
| 15    | Benzo(g,h,i)perylene       | 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10.28)</sup> |
| 16    | Beryllium                  | 1) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10.25)</sup> |
| 17    | Bis(2-chloroethyl)ether... | 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10.28)</sup> |

| ลำดับ | สารมลพิษ          | วิธีวิเคราะห์                                                                                                   |
|-------|-------------------|-----------------------------------------------------------------------------------------------------------------|
| 32    | Toxaphene         | 1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(3.6.23)</sup> |
| 33    | Trichloroethylene | 2) Ultrasonic Extraction, Gas Chromatographic Method <sup>(10.25)</sup>                                         |
| 34    | Vanadium          | 1) Waste Extraction, Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(3.12.27)</sup>         |
| 35    | Zinc              | 2) Waste Extraction, Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method <sup>(3.11.27)</sup>  |
|       |                   | 3) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(13.27)</sup>                             |
|       |                   | 4) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method <sup>(11.27)</sup>                      |
|       |                   | 1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>(3.6.14)</sup>                           |
|       |                   | 2) Digestion, Inductively Coupled Plasma Method <sup>(7.14)</sup>                                               |
|       |                   | 1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method <sup>(3.6.15)</sup>                |
|       |                   | 2) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>(3.6.14)</sup>                           |
|       |                   | 3) Digestion, Flame Atomic Absorption Spectrometric Method <sup>(7.15)</sup>                                    |
|       |                   | 4) Digestion, Inductively Coupled Plasma Method <sup>(7.14)</sup>                                               |

ติบ จำนวน 125 รายการ

| ลำดับ | สารมลพิษ     | วิธีวิเคราะห์                                                                              |
|-------|--------------|--------------------------------------------------------------------------------------------|
| 1     | Acenaphthene | 1) Ultrasonic Extraction, Gas Chromatographic Method <sup>(10.25)</sup>                    |
| 2     | Acetone      | 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10.28)</sup> |
| 3     | Aldrin       | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(13.27)</sup>           |
| 4     | Anthracene   | 1) Ultrasonic Extraction, Gas Chromatographic Method <sup>(10.25)</sup>                    |
|       |              | 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10.28)</sup> |
|       |              | 1) Ultrasonic Extraction, Gas Chromatographic Method <sup>(10.25)</sup>                    |
|       |              | 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10.28)</sup> |
|       |              | 1) Ultrasonic Extraction, Gas Chromatographic Method <sup>(10.25)</sup>                    |

| ลำดับ | สารมลพิษ              | วิธีวิเคราะห์                                                                                                                                                                                                                                                                                                                        |
|-------|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 33    | Chromium              | 1) Digestion, Flame Atomic Absorption Spectrometric Method <sup>(7,15)</sup><br>2) Digestion, Inductively Coupled Plasma Method <sup>(7,16)</sup>                                                                                                                                                                                    |
| 34    | Chromium (III)        | 1) Digestion, Flame Atomic Absorption Spectrometric Method; Alkaline Digestion, Colorimetric Method; Calculation <sup>(7,8,15,17)</sup><br>2) Digestion, Inductively Coupled Plasma Method; Alkaline Digestion, Colorimetric Method; Calculation <sup>(7,8,14,17)</sup><br>Alkaline Digestion, Colorimetric Method <sup>(8,17)</sup> |
| 35    | Chromium (VI)         | 1) Ultrasonic Extraction, Gas Chromatographic Method <sup>(10,25)</sup><br>2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup>                                                                                                                                                                |
| 36    | Chrysene              | Extraction, Distillation, Colorimetric Method <sup>(29,30)</sup><br>Ultrasonic Extraction, Gas Chromatographic Method <sup>(26)</sup>                                                                                                                                                                                                |
| 37    | Cyanide               | 1) Ultrasonic Extraction, Gas Chromatographic Method <sup>(10,23)</sup><br>2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup>                                                                                                                                                                |
| 38    | 2,4-D                 | 1) Ultrasonic Extraction, Gas Chromatographic Method <sup>(10,23)</sup><br>2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup>                                                                                                                                                                |
| 39    | DDD                   | 1) Ultrasonic Extraction, Gas Chromatographic Method <sup>(10,23)</sup><br>2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup>                                                                                                                                                                |
| 40    | DDE                   | 1) Ultrasonic Extraction, Gas Chromatographic Method <sup>(10,23)</sup><br>2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup>                                                                                                                                                                |
| 41    | DDT                   | 1) Ultrasonic Extraction, Gas Chromatographic Method <sup>(10,23)</sup><br>2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup>                                                                                                                                                                |
| 42    | Dibenz(a,h)anthracene | 1) Ultrasonic Extraction, Gas Chromatographic Method <sup>(10,25)</sup><br>2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup>                                                                                                                                                                |
| 43    | Di-n-butyl phthalate  | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup><br>Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(13,27)</sup>                                                                                                                                                          |
| 44    | 1,2-Dichlorobenzene   | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(13,27)</sup>                                                                                                                                                                                                                                              |

45 1,3-Dichlorobenzene...

| ลำดับ | สารมลพิษ                   | วิธีวิเคราะห์                                                                                                                                                                     |
|-------|----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 17    | Bis(2-chloroethyl)ether    | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup>                                                                                           |
| 18    | Bis(2-ethylhexyl)phthalate | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup>                                                                                           |
| 19    | Bromodichloromethane       | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(13,27)</sup>                                                                                                  |
| 20    | Bromoform                  | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(13,27)</sup>                                                                                                  |
| 21    | Butanol                    | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(13,27)</sup>                                                                                                  |
| 22    | Butyl benzyl phthalate     | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup>                                                                                           |
| 23    | Cadmium                    | 1) Digestion, Flame Atomic Absorption Spectrometric Method <sup>(7,15)</sup><br>2) Digestion, Inductively Coupled Plasma Method <sup>(7,16)</sup>                                 |
| 24    | Carbazole                  | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup>                                                                                           |
| 25    | Carbon disulfide           | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(13,27)</sup>                                                                                                  |
| 26    | Carbon tetrachloride       | 1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(13,27)</sup><br>2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method <sup>(11,27)</sup> |
| 27    | Chlordane                  | 1) Ultrasonic Extraction, Gas Chromatographic Method <sup>(10,23)</sup><br>2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup>             |
| 28    | p-Chloroaniline            | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup>                                                                                           |
| 29    | Chlorobenzene              | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(13,27)</sup>                                                                                                  |
| 30    | Chlorodibromomethane       | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(13,27)</sup>                                                                                                  |
| 31    | Chloroform                 | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(13,27)</sup>                                                                                                  |
| 32    | 2-Chlorophenol             | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup>                                                                                           |

33 Chromium...

| ลำดับ | สารเคมี              | วิธีวิเคราะห์                                                                                                                                                                            |
|-------|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 58    | Diethyl phthalate    | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup>                                                                                                  |
| 59    | 2,4-Dimethylphenol   | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup>                                                                                                  |
| 60    | 2,4-Dinitrophenol    | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup>                                                                                                  |
| 61    | 2,4-Dinitrotoluene   | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup>                                                                                                  |
| 62    | 2,6-Dinitrotoluene   | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup>                                                                                                  |
| 63    | Di-n-Octyl phthalate | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup>                                                                                                  |
| 64    | Endosulfan           | 1) Ultrasonic Extraction, Gas Chromatographic Method <sup>(10,23)</sup><br>2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup>                    |
| 65    | Endrin               | 1) Ultrasonic Extraction, Gas Chromatographic Method <sup>(10,23)</sup><br>2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup>                    |
| 66    | Ethylbenzene         | 1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(13,27)</sup><br>2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method <sup>(11,27)</sup>        |
| 67    | Fluoranthene         | 1) Ultrasonic Extraction, Gas Chromatographic Method <sup>(10,23)</sup><br>2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup>                    |
| 68    | Fluorene             | 1) Ultrasonic Extraction, Gas Chromatographic Method <sup>(10,23)</sup><br>2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup>                    |
| 69    | Heptachlor           | 1) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup><br>2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,23)</sup> |
| 70    | Heptachlor epoxide   | 1) Ultrasonic Extraction, Gas Chromatographic Method <sup>(10,23)</sup>                                                                                                                  |

Heptachlor epoxide (คต)...

| ลำดับ | สารเคมี                    | วิธีวิเคราะห์                                                                                                                                                                     |
|-------|----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 45    | 1,3-Dichlorobenzene        | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(13,27)</sup>                                                                                                  |
| 46    | 1,4-Dichlorobenzene        | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(13,27)</sup>                                                                                                  |
| 47    | 3,3'-Dichlorobenzidine     | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup>                                                                                           |
| 48    | 1,1-Dichloroethane         | 1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(13,27)</sup><br>2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method <sup>(11,27)</sup> |
| 49    | 1,2-Dichloroethane         | 1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(13,27)</sup><br>2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method <sup>(11,27)</sup> |
| 50    | 1,1-Dichloroethylene       | 1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(13,27)</sup><br>2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method <sup>(11,27)</sup> |
| 51    | cis-1,2-Dichloroethylene   | 1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(13,27)</sup><br>2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method <sup>(11,27)</sup> |
| 52    | trans-1,2-Dichloroethylene | 1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(13,27)</sup><br>2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method <sup>(11,27)</sup> |
| 53    | 2,4-Dichlorophenol         | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup>                                                                                           |
| 54    | 1,2-Dichloropropane        | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(13,27)</sup>                                                                                                  |
| 55    | 1,3-Dichloropropane        | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(13,27)</sup>                                                                                                  |
| 56    | 1,3-Dichloropropene        | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(13,27)</sup>                                                                                                  |
| 57    | Dieldrin                   | 1) Ultrasonic Extraction, Gas Chromatographic Method <sup>(10,23)</sup><br>2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup>             |

58 Diethyl phthalate...

| ลำดับ | สารมลพิษ                                 | วิธีวิเคราะห์                                                                                                                                                                                                                                                           |
|-------|------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 83    | Mercury                                  | 1) Digestion, Cold-Vapor Atomic Absorption Spectrometric Method <sup>[19]</sup><br>2) Thermal Decomposition Amalgamation and Atomic Absorption Spectrometric Method <sup>[20]</sup><br>Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[13,27]</sup> |
| 84    | Methanol                                 | 1) Ultrasonic Extraction, Gas Chromatographic Method <sup>[10,23]</sup>                                                                                                                                                                                                 |
| 85    | Methoxychlor                             | 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[10,28]</sup><br>Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[13,27]</sup>                                                                                          |
| 86    | Methyl bromide                           | 1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[13,27]</sup>                                                                                                                                                                                     |
| 87    | Methylene chloride                       | 2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method <sup>[11,27]</sup><br>Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[10,28]</sup>                                                                                   |
| 88    | 2-Methylphenol                           | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[10,28]</sup>                                                                                                                                                                                 |
| 89    | 2-Methylnaphthalene                      | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[10,28]</sup>                                                                                                                                                                                 |
| 90    | Methyl tert-butyl ether                  | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[13,27]</sup>                                                                                                                                                                                        |
| 91    | Naphthalene                              | 1) Ultrasonic Extraction, Gas Chromatographic Method <sup>[10,25]</sup><br>2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[10,28]</sup>                                                                                                   |
| 92    | Nickel                                   | 1) Digestion, Flame Atomic Absorption Spectrometric Method <sup>[7,15]</sup><br>2) Digestion, Inductively Coupled Plasma Method <sup>[7,14]</sup>                                                                                                                       |
| 93    | Nitrobenzene                             | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[10,28]</sup>                                                                                                                                                                                 |
| 94    | N-Nitrosodiphenylamine                   | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[10,28]</sup>                                                                                                                                                                                 |
| 95    | N-Nitrosodi-n-propylamine                | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[10,28]</sup>                                                                                                                                                                                 |
| 96    | Polychlorinated Biphenyls - Aroclor 1016 | 1) Ultrasonic Extraction, Gas Chromatographic Method <sup>[10,24]</sup>                                                                                                                                                                                                 |

Polychlorinated Biphenyls(สต่อ)...

| ลำดับ | สารมลพิษ                  | วิธีวิเคราะห์                                                                                                                                                         |
|-------|---------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 70    | Heptachlor epoxide (สต่อ) | 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[10,28]</sup>                                                                            |
| 71    | Hexachlorobenzene         | 1) Ultrasonic Extraction, Gas Chromatographic Method <sup>[10,23]</sup><br>2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[10,28]</sup> |
| 72    | Hexachloro-1,3-butadiene  | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[13,27]</sup>                                                                                      |
| 73    | n-Hexane                  | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[13,27]</sup>                                                                                      |
| 74    | $\alpha$ -HCH             | 1) Ultrasonic Extraction, Gas Chromatographic Method <sup>[10,23]</sup><br>2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[10,28]</sup> |
| 75    | $\beta$ -HCH              | 1) Ultrasonic Extraction, Gas Chromatographic Method <sup>[10,23]</sup><br>2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[10,28]</sup> |
| 76    | $\gamma$ -HCH             | 1) Ultrasonic Extraction, Gas Chromatographic Method <sup>[10,23]</sup><br>2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[10,28]</sup> |
| 77    | Hexachlorocyclopentadiene | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[10,28]</sup>                                                                               |
| 78    | Hexachloroethane          | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[10,28]</sup>                                                                               |
| 79    | Indeno(1,2,3-cd)pyrene    | 1) Ultrasonic Extraction, Gas Chromatographic Method <sup>[10,25]</sup><br>2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[10,28]</sup> |
| 80    | Isophorone                | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[10,28]</sup>                                                                               |
| 81    | Lead                      | 1) Digestion, Flame Atomic Absorption Spectrometric Method <sup>[7,15]</sup><br>2) Digestion, Inductively Coupled Plasma Method <sup>[7,14]</sup>                     |
| 82    | Manganese                 | 1) Digestion, Flame Atomic Absorption Spectrometric Method <sup>[7,15]</sup><br>2) Digestion, Inductively Coupled Plasma Method <sup>[7,14]</sup>                     |

83 Mercury...



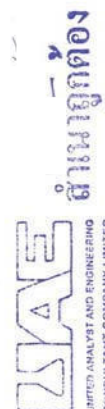
| ลำดับ | สารมลพิษ | วิธีวิเคราะห์                                                                                                                                     |
|-------|----------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| 125   | Zinc     | 1) Digestion, Flame Atomic Absorption Spectrometric Method <sup>(7,15)</sup><br>2) Digestion, Inductively Coupled Plasma Method <sup>(7,14)</sup> |

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| ลำดับ | สารมลพิษ               | วิธีวิเคราะห์                                                                                                                                                                     |
|-------|------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 111   | 1,2,4-Trichlorobenzene | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(13,27)</sup>                                                                                                  |
| 112   | 1,1,1-Trichloroethane  | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(13,27)</sup>                                                                                                  |
| 113   | 1,1,2-Trichloroethane  | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(13,27)</sup>                                                                                                  |
| 114   | Trichloroethylene      | 1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(13,27)</sup><br>2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method <sup>(11,27)</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>(13,27)</sup>                                                                                                  |
| 118   | Vanadium               | Digestion, Inductively Coupled Plasma Method <sup>(7,14)</sup>                                                                                                                    |
| 119   | Vinyl acetate          | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(13,27)</sup>                                                                                                  |
| 120   | Vinyl chloride         | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(13,27)</sup>                                                                                                  |
| 121   | m-Xylene               | 1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(13,27)</sup><br>2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method <sup>(11,27)</sup> |
| 122   | o-Xylene               | 1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(13,27)</sup><br>2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method <sup>(11,27)</sup> |
| 123   | p-Xylene               | 1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(13,27)</sup><br>2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method <sup>(11,27)</sup> |
| 124   | Xylene (Total)         | 1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(13,27)</sup><br>2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method <sup>(11,27)</sup> |

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